# **CUMULATIVE INDEXES**

### CONTRIBUTING AUTHORS, VOLUMES 25-29

A

Albrecht, A. C., 29:421-40 Andersen, H. C., 26:145-66 Anderson, L. L., 26:339-57

B

Bak, T. A., 25:1-10
Barisas, B. G., 29:141-66
Barron, L. D., 26:381-96
Bauer, D. R., 27:443-63
Benzinger, J., 29:285-306
Berne, B. J., 25:233-53
Berry, M. J., 26:259-86
Berson, J. A., 28:111-32
Bird, R. B., 28:185-206
Bixon, M., 27:85-84
Blaney, B. L., 27:553-86
Bloomfield, V. A., 28:233-59

Bocian, D. F., 29:307-35 Bonner, J. C., 27:291-317 Brauman, J. I., 27:443-63 Bryant, R. G., 29:167-88 Buckingham, A. D., 26:381-96

C

Carlson, T. A., 26:211-33 Ceyer, S. T., 26:477-99 Chan, S. I., 29:397-35 Chandler, D., 29:441-71 Chang, K. C., 27:369-85 Cole, R. H., 28:283-300 Cowley, J. M., 29:251-83

E

Eisenthal, K. B., 28:207-32 El-Sayed, M. A., 26:235-58 Erpenbeck, J. J., 27:319-48 Ewing, G. E., 27:553-86 Eyring, E. M., 25:255-74 Eyring, H., 25:39-77; 27:45-57; 28:1-13 F

Farrar, J. M., 25:357-85 Ferguson, E. E., 26:17-38 Field, R. J., 25:95-119 Flynn, G. W., 25:275-315; 28:261-82 Franklin, J. L., 25:485-526

G

Gasparoux, H., 27:175-201
Gelbart, W. M., 28:323-48
Gershfeld, N. L., 27:349-68
Gill, S. J., 29:141-66
Goddard, W. A. III., 29:363-96
Goldanskii, V. L., 27:85-126
Gole, J. L., 27:526-49
Gordon, L. G. M., 25:11-38
Green, J. C., 28:161-83
Grunwald, E., 27:369-85
Gubbins, K. E., 28:373-410

H

Harding, L. B., 29:363-96 Harland, P. W., 25:485-526 Harris, C. B., 29:473-95 Haydon, D. A., 25:11-38 Henderson, D., 25:461-83 Hladky, S. B., 25:11-38 Hoffmann, G. W., 26:123-44 Honig, B., 29:31-57 Hudson, B., 25:437-60 Hyde, J. S., 25:407-35 Hynes, J. T., 28:301-21

J

Jhon, M. S., 27:45-57 Johnson, B. B., 27:465-91 Johnson, K. H., 26:39-57 Johnson, W. C. Jr., 29:93-114 Johnston, H. S., 26:315-38 Jonas, J., 26:167-90 Jørgensen, P., 26:359-80

K

Kahlwett, M., 27:59-63 Kaiser, W., 26:83-100 Kebarle, P., 28:445-76 Kellogg, H. H., 27:387-406 Kepler, R. G., 29:497-518 King, D. L., 27:407-42 Kinsey, J. L., 28:349-72 Klein, F. S., 26:191-210 Knaap, H. F. P., 26:59-81 Knudtson, J. T., 25:255-74 Kohler, B., 25:437-60

T.

Lallemand, P., 26:59-81 Laubereau, A., 26:83-100 Lee, J. H. S., 28:75-104 Lee, Y. T., 25:357-85 Leffler, J. E., 27:369-85 Lemont, S., 28:261-82 Letokhov, V. S., 28:133-59 Levine, R. D., 29:59-92 Libby, W. F., 28:105-10 Lin, S. H., 25:39-77 Luzzati, V., 25:79-94

M

Madix, R. J., 29:285-306 Marcuson, S. W., 27:387-406 Matthews, B. W., 27:493-523 Miller, T. A., 27:127-52 Miller, W. G., 29:519-35 Mulliken, R. S., 29:1-30

N

Nagle, J. F., 27:291-317 Noyes, R. M., 25:95-119 Nozik, A. J., 29:189-222

0

O'Grady, W. E., 26:287-314

# 598 CONTRIBUTING AUTHORS

p	Simons, J., 28:15-45	Verkleij, A. J., 26:101-22
Patel, D. J., 29:337-62	Somorjai, G. A., 28:477- 99	Ververgaert, P. H. J. Th., 26:101-22
Pecora, R., 25:233-53; 27: 443-63	Soos, Z. G., 25:121-53 Spiro, T. G., 28:501-21	W
Peticolas, W. L., 27:465-91	Stein, P., 28:501-21	
Porter, R. N., 25:317-55	Stephens, P. J., 25:201-32	Wade, C. G., 28:47-73
Prost, J., 27:175-201	Street, W. B., 28:373-410	Weinberg, W. H., 29:115-39
	Swinton, F. L., 27:153-74	Weitz, E., 25:275-315
R	Swofford, R. L., 29:421-40	Wheeler, J. C., 28:411-43 Wilson, M. K., 26:1-16
Rabitz, H., 25:155-77	T	Wiser, W. H., 26:339-57
Rao, Y. K., 27:387-406		Wood, W. W., 27:319-48
	Tardieu, A., 25:79-94	Wyatt, R. E., 27:1-43
S	Taylor, R. E., 25:387-405	****
	Toennies, J. P., 27:225-	Y
Schaefer, H. F. III, 27:261-	60	
90	Troe, J., 29:223-50	Yamakawa, H., 25:179-200
Schwendeman, R. H., 29:537-58	Truhlar, D. G., 27:1-43	Yeager, E., 26:287-314
Sen, R. K., 26:287-314	V	Z
Setser, D. W., 27:407-42		
Silbey, R., 27:203-23	Vaughan, R. W., 29:397-419	Zwemer, D. A., 29:473-95

CHAPTER TITLES VOLUMES 25 26		
CHAPTER TITLES, VOLUMES 25-29	,	
BIOPHYSICAL CHEMISTRY		
Hydrodynamics in Biophysical Chemistry Light Energy Transduction in Visual	V. A. Bloomfield	28:233-59
Pigments and Bacteriorhodopsin Microcalorimetry of Biological Sys-	B. Honig	29:31-57
tems NMR Studies of Membrane Structure and	B. G. Barisas, S. J. Gill	29:141-66
Dynamics	D. F. Bocian, S. I. Chan	29:307-35
High Resolution NMR Studies of the Structure and Dynamics of tRNA in Solution	D. J. Patel	29:337-62
DIELECTRIC POLARIZATION	D. V. Pares	201337-02
Time Domain Reflectometry ELECTROCHEMISTRY	R. H. Cole	28:283-300
Theory of Charge Transfer at Electro-		
chemical Interfaces	R. K. Sen, E. Yeager, W. E. O'Grady	26:287-314
Photoelectrochemistry: Applications to Solar		201201 021
Energy Conversion	A. J. Nozik	29:189-222

ELECTRON MICROSCOPY		
The Architecture of Biological and Artificial		
Membranes as Visualized by Freeze Etching	A. J. Verkleij, P. H. J. Th. Ververgaert	26:101-22
FUELS	- Control of the Cont	
Transformation of Solids to Liquid Fuels	W. H. Wiser, L. L. Anderson	26:339-57
ION EXCHANGE, IONS		
Gaseous Negative Ions	J. L. Franklin, P. W. Har- land	25:485-526
Ion-Molecule Reactions	E. E. Ferguson	26:17-38
Ion Thermochemistry and Solvation from	-	
Gas Phase Ion Equilibria	P. Kebarle	28:445-76
ISOTOPES		
Lipid Phases: Structure and Structural		
Transitions	V. Luzzati, A. Tardieu	25:79-94
Oscillatory Chemical Reactions	R. M. Noyes, R. J. Field	25:95-119
Laser Studies of Vibrational and Rotational		
Relaxation in Small Molecules	E. Weitz, G. Flynn	25:275-315
Molecular Trajectory Calculations	R. N. Porter	25:317-55
Chemical Dynamics	J. M. Farrar, Y. T. Lee	25:357-85
Excitable Membranes	R. E. Taylor	25:387-405
Laser Separation of Isotopes	V. S. Letokhov	28:133-59
KINETICS - GENERAL		
Chemical Reactions at Very Low Tempera-		
tures	V. I. Goldanskii	27:85-126
Phase Transitions—Beyond the Simple Ising		
Model	J. F. Nagle, J. C. Bonner	27:291-317
Thermal Rearrangements	J. A. Berson	28:111-32
KINETICS - GASES		
Theory of Simple Mixtures	D. Henderson	25:461-83
The Calculation and Measurement of Cross		
Sections for Rotational and Vibrational		
Excitation	J. P. Toennies	27:225-60
Molecular Dynamics and Monte Carlo		
Calculations in Statistical Mechanics	W. W. Wood, J. J. Erpenbeck	27:319-48
Reactions of Electronically Excited-State		
Atoms	D. L. King, D. W. Setser	27:407-42
Information Theory Approach to Molecular		
Reaction Dynamics	R. D. Levine	29:59-92
Atom and Radical Recombination Reactions	J. Troe	29:223-50
KINETICS - SOLUTIONS		
Picosecond Spectroscopy of Molecular		
Dynamics in Liquids	A. Laubereau, W. Kaiser	26:83-100
Isotope Effects in Chemical Kinetics	F. S. Klein	26:191-210
Effects of Molecular Mobility on Reaction		
Rates in Liquid Solutions	E. Grunwald, K. C. Chang,	
P1	J. E. Leffler	27:369-85
Electron Tunneling in Chemistry and Biology	W. F. Libby	28:105-10
LASERS	H P D Passe D T W	
Light Scattering by Gases	H. F. P. Knapp, P. Lalle-	
Leave Studies of Cas Phone Chamin & D.	mand	26:59-81
Laser Studies of Gas Phase Chemical Reaction	M X D	
Dynamics Vibrational State Analysis of Florinaria to	M. J. Berry	26:259-86
Vibrational State Analysis of Electronic-to- Vibrational Energy Transfer Processes	S Lamont C W Phys	99.961.69
Laser-Induced Fluorescence	S. Lemont, G. W. Flynn	28:261-82

J. L. Kinsey

J. S. Hyde

H. C. Andersen

28:349-72

26:145-66

25:407-35

Laser-Induced Fluorescence

The Structure of Liquids

Paramagnetic Relaxation

LIQUIDS

MAGNETISM

## 600 CHAPTER TITLES

8

ΛI

MICROWAVES		
Double Resonance and the Properties of the		
Lowest Excited Triplet State of Organic		
Molecules	M. A. El-Sayed	26:235-58
NUCLEAR MAGNETIC RESONANCE	M. A. Di-Dayou	20:230-30
Nuclear Magnetic Resonance at High Pressures NMR Relaxation in Thermotropic Liquid	J. Jonas	26:167-90
Crystals	C. G. Wade	28:47-73
NMR Relaxation Studies of Solute-Solvent	C. G. Wade	20:41-13
Interactions	R. G. Bryant	29:167-88
High Resolution, Solid State NMR	R. W. Vaughan	29:397-419
OPTICAL ROTATORY POWER	Att. III. Thompson	20,001-120
Magnetic Circular Dichroism	P. J. Stephens	25:201-32
Circular Dichroism Spectroscopy and the	a , a , magnitude	201207 02
Vacuum Ultraviolet Region	W. C. Johnson Jr.	29:93-114
ORGANIC REACTIONS		
The Stochastic Theory of the Origin of the		
Genetic Code	G. W. Hoffmann	26:123-44
POLLUTION		
Pollution of the Stratosphere	H. S. Johnston	26:315-38
POLYENES		
Linear Polyene Electronic Structure and		
Spectroscopy	B. Hudson, B. Kohler	25:437-60
POLYMERS		
Polymer Statistical Mechanics	H. Yamakawa	25:179-200
Polymer Dynamics in Solution	M. Bixon	27:65-84
Rheology and Kinetic Theory of Polymeric		
Liquids	R. B. Bird	28:185-206
Stiff Chain Polymer Lyotropic Liquid Crystals	W. G. Miller	29:519-35
PREFATORY CHAPTERS		
The History of Physical Chemistry in Denmark	T. A. Bak	25:1-10
The Top Twenty and the Rest: Big Chemistry		
and Little Funding	M. K. Wilson	26:1-16
History of H <sub>3</sub> Kinetics	D. G. Truhlar, R. E. Wyatt	27:1-43
Men, Mines, and Molecules	H. Eyring	28:1-13
Chemical Bonding	R. S. Mulliken	29:1-30
QUANTUM THEORY		
Quantum Chemistry	K. H. Johnson	26:39-57
Molecular and Atomic Applications of Time-	/	
Dependent Hartree-Fock Theory	P. Jørgensen	26:359-80
Molecular Electronic Structure Theory: 1972-	W P Colombia IV	00.001.00
1975	H. F. Schaefer III	27:261-90
The Description of Chamberl Bondier from Ab	J. Simons	28:15-45
The Description of Chemical Bonding from Ab Initio Calculations	W A Coddend III I D	
mitto Calculations	W. A. Goddard III, L. B. Harding	29:363-96
RADIATION CHEMISTRY	narding	29:303-90
Laser Light Scattering from Liquids	B. J. Berne, R. Pecora	25:233-53
Laser-Induced Chemical Reactions	J. T. Knudtson, E. M.	20:233-33
Laser-mouced Chemical Reactions	Eyring	25:255-74
SHOCK WAVES	Lyring	20:200-14
Initiation of Gaseous Detonation	J. H. S. Lee	28:75-104
SOLID STATE	o. n. o. Lee	20:10-104
Photoelectron Spectroscopy: Study of Valence		
Bands in Solids	J. C. Green	28:161-83
Coherent Energy Transfer in Solids	C. B. Harris, D. A. Zwemer	
Piezoelectricity, Pyroelectricity, and Ferro-		-0.710 00
electricity in Organic Materials	R. G. Kepler	29:497-518
SOLUTIONS - NONELECTROLYTES	and anopion	20,701-010
Solutions of Nonelectrolytes	F. L. Swinton	27:153-74

SPECTROSCOPY		
Theory of # - Molecular Charge-Transfer		
Crystals	Z. G. Soos	25:121-53
Rotation and Rotation-Vibration Pressure-		
Broadened Spectral Lineshapes	H. Rabitz	25:155-77
Photoelectron Spectroscopy	T. A. Carlson	26:211-33
Rayleigh and Raman Optical Activity	L. D. Barron, A. D. Bucking- ham	
The Spectroscopy of Simple Free Radicals	T. A. Miller	26:381-96
Picosecond Spectroscopy	K. B. Eisenthal	27:127-52
Photodissociation Dynamics of Polyatomic	K. B. Elsenmai	28:207-32
Molecules	W. M. Gelbart	
Inelastic Electron Tunneling Spectroscopy:	w. M. Gelbart	28:323-48
A Probe of the Vibrational Structure of		
Surface Species	W. H. Weinberg	00 110 00
Nonlinear Spectroscopy	R. L. Swofford, A. C.	29:115-39
***************************************	Albrecht	20-401 40
Transient Effects in Microwave Spectroscopy	R. H. Schwendeman	29:421-40
SPECTROSCOPY - INFRARED	A. Schweitengu	29:537-58
The Resonant Raman Effect	B. B. Johnson, W. L.	
	Peticolas	05 405 64
Resonance Effects in Vibrational Scattering	reticolas	27:465-91
from Complex Molecules	T. G. Spiro, P. Stein	20.001 01
STATISTICAL MECHANICS	a. o. spiro, r. stem	28:501-21
Stochastic Processes in Physical Chemistry	S. H. Lin, H. Eyring	25:39-77
Statistical Mechanics of Molecular Motion in	or are and are alyting	23:35-11
Dense Fluids	J. T. Hynes	28:301-21
Decorated Lattice-Gas Models of Critical	and and and a	20:301-21
Phenomena in Fluids and Fluid Mixtures	J. C. Wheeler	28:411-43
STRUCTURE - CRYSTALS		20,411-43
Electronic Energy Transfer in Molecular		
Crystals	R. Silbey	27:203-23
X-Ray Crystallographic Studies of Proteins	B. W. Matthews	27:493-523
STRUCTURE - LIQUIDS		211100 020
The Structure of Liquids	H. C. Andersen	26:145-66
Liquid Theory and the Structure of Water	M. S. Jhon, H. Eyring	27:45-57
Liquid Crystals	H. Gasparoux, J. Prost	27:175-201
Depolarized Light Scattering from Liquids	D. R. Bauer, J. I. Brauman,	
Liquide of Lincon Molecules Committee	R. Pecora	27:443-63
Liquids of Linear Molecules: Computer Simulation and Theory		
Structures of Molecular Liquids	W. B. Streett, K. E. Gubbins	28:373-410
STRUCTURE - MOLECULES	D. Chandler	29:441-71
Molecular Mechanisms of Ion Transport in		
Liquid Membranes	6 D W	
and are memor disca	S. B. Hladky, L. G. M.	
Molecular Trajectory Calculations	Gordon, D. A. Haydon	25:11-38
Van der Waals Molecules	R. N. Porter	25:317-55
SURFACE CHEMISTRY	B. L. Blaney, G. E. Ewing	27:553-86
Kinetics of Crystallization	M. Kahlweit	
Physical Chemistry of Lipid Films at Fluid	m. Kamwett	27:59-63
Interfaces	N. L. Gershfeld	05 040 00
Surface Scattering	5. T. Ceyer, G. S. Somorjai	27:349-68
High Resolution Electron Microscopy of Crystal	S. 1. Ceyer, G. S. Somorjai	28:477-99
Defects and Surfaces	J. M. Cowley	29:251-83
Kinetic Processes on Metal Single-Crystal	o. a. cowiej	20:201-03
Surfaces	R. J. Madix, J. Benziger	29:285-306
THERMOCHEMISTRY AND THERMODYNAMICS	v	201200-306
Pyrometallurgy	H. H. Kellogg, Y. K. Rao,	
	S. W. Marcuson	27:387-406

# 602 CHAPTER TITLES

High Temperature Chemistry: Modern Research and New Frontiers

J. L. Gole

27:526-49



L

8

ΛI

# **AUTHOR INDEX**

A

Aartsma, T., 488 Abbas, N. M., 275 Abbate, J., 343, 344 Abe, K., 211 Abkowitz, M., 508 Abragam, A., 167, 310, 315, 316, 398-401, 403 Abraham, F. F., 445 Abrahamson, E. W., 34, 37, 45, 47 Abrahamson, H. B., 203, 209 Ackerman, J. L., 409, 410 Ackerman, T., 158 Ackers, G. K., 153 Acrivos, A., 451 Adachi, H., 287 Adams, A., 346 Adams, D. L., 292, 293 Adams, W. A., 148 Adane, A., 117, 124 Adler, B. J., 443 Adler, J. G., 124, 126, 127, 135 Agmon, N., 65, 85 Ahlrichs, R., 13, 385 Ahluwalia, J. C., 148 Ahmad, S. B., 184 Ailion, D. C., 398 Aisen, P., 179 Akai, J. A., 176, 451 Albain, J. L., 254 Alben, R., 519, 526 Albert, A., 149 Albery, W. J., 191 ALBRECHT, A. C., 421-40; 37, 428 Alchalel, A., 44, 45, 47, 51, Alder, B. J., 447, 449, 450 Alder, R., 174 Alexander, M. H., 73 Alexander, S., 67, 75, 76 Alfano, R. R., 49, 50, 53 Alfonso, G., 529 Alhassid, Y., 59, 61, 62, 65, 66, 68, 69, 71, 73, 75, 80, 82-86 Alla, M., 406 Allen, A. R., 236 Allen, L. C., 22 Allen, P. S., 398

Allen, S., 96, 97, 100 Allen, S. D., 96, 97, 99, 100 Allerhand, A., 332, 359 Allewell, N. M., 152 Alley, W. E., 447 Allison, D. A., 11 Allison, J. H., 11 Allnatt, A. R., 452 Allpress, J. G., 262, 276 Allyn, C. L., 287 Almlöf, J., 23 Alms, G. R., 453, 465 Alton, B., 39, 45, 46, 49 Alvarez, J., 146, 154 Amamiya, T., 211 Amano, T., 537, 538, 541, 543-45, 547, 548, 553-55 Amberg, C. H., 116 Ambrose, E. J., 519 Anastasi, C., 237, 238, 244 Andersen, H. C., 433, 441-43, 445, 446, 448, 449, 450, 459, 460, 467 Anderson, C. F., 168, 176, 184 Anderson, J., 287, 288 Anderson, J. G., 237 Anderson, J. M., 527 Anderson, J. S., 273 Anderson, P. W., 315, 319, 490, 549 Anderson, R. A., 505, 506, 508, 509, 511, 512, 514, Anderson, R. J. M., 434 Anderson, S., 287, 295 Anderson, W. A., 551 Anderson, W. W., 191, 213, Andersson, K. E., 161 Andrew, E. R., 397, 398, 401, 405, 407 Andronikashvili, E. L., 153, 154 Angell, C. A., 451 Anstis, G. R., 257, 259 Aoki, H., 529 Apeloig, Y., 21 Apgar, J., 337 Appel, D., 226 Appelman, E. H., 236 Applebury, M. L., 47, 49,

50, 52, 53 Appleman, B. R., 402 Appleton, J. P., 226, 231-33 Archer, B. G., 150 Archer, M. D., 191 Argyrakis, P., 493 Aritake, T., 527 Armitage, I. M., 309 Armstrong, G. T., 160-62 Arndt, E., 450 Arnold, B., 158 Arnold, F. E., 530 Arnold, G. S., 65, 79, 82 Arnott, S., 340 Arter, D. B., 344 Arvidson, G., 308, 309, 314, 332 Asato, A., 37 Ascione, R., 346 Ashida, T., 44 Ashkin, A., 434 Aslaksen, E. W., 509 Assfalg, A., 512 Assman, G., 332 Ast, D. G., 267 Astholz, D. C., 236, 239, 240 Atabek, O., 66 Atanasov, B. P., 153 Atkinson, R., 236, 237, 244 Aton, B., 41, 42, 53, 49, 50 Au, A. Y., 260, 261, 262 Aue, W. P., 409 Augustin, S. D., 68 Avakian, P., 475, 493 Avedikian, L., 145 Averill, F. W., 287

B

Baase, W. A., 100 Bach, P., 451 Bachmann, P., 409 Bader, R. F. W., 17 Baer, M., 75, 76, 81 Baer, T., 79 Bagratashvili, V. N., 429 Bagus, P. S., 10, 393, 394 Bailey, S. M., 363 Bair, R., 254 Bair, T. I., 527, 529, 530 Baird, N. C., 19 Bak, B., 21 Bak, C. S., 502, 514 Baker, C. C., 100 Baker, J. M., 287

Baker, J. W., 22 Bakker, S., 143 Balasubramaniyan, P., 37 Balasubramaniyan, V., 37 Balazs, E. A., 111 Balcerski, J. S., 102, 103, Baldassare, J. J., 158 Baldwin, R. R., 236 Baldwin, V. H. Jr., 298 Balogh-Nair, V., 37, 46 Balooch, M., 295 Bando, Y., 279 Bangerter, B. W., 176 Baraban, J. M., 34 Baram, Z., 431 Baranov, V. G. G., 525 Bard, A. J., 191, 201, 202, 209, 210, 212, 214 Bardeen, J., 121 Barenholz, Y., 36, 158 Barford, B. D., 289, 293 Barg, G. D., 86 Bargoot, F. G., 36 BARISAS, B. G., 141-66; 143, 150, 151 Barker, J. A., 446 Barker, J. R., 238 Barker, R. C., 129 Barnes, A. J., 117 Baroin, A., 34 Barojas, J., 450, 456, 465 Barrell, B. G., 337 Barrett, J. J., 433, 434 Bartholdi, E., 409 Bartuska, V. J., 403, 406, Barziv, E., 78 Basila, J. R., 227 Bassini, M., 429 Bastedo-Lerner, D., 344 Bastie, P., 514 Batifol, E., 425 Bauer, D. R., 545, 550, 553-55 Bauer, P. J., 37 Bauer, S. H., 233 Bauerle, G. L., 209 Baugher, J. F., 397, 403, Baughman, R. J., 209 Baulch, D. L., 223, 226, 236, 238, 239, 245 Baumann, T., 410 Baumeister, W., 269 Bauschlicher, C. W. Jr., 391, 393, 394 Bawden, F. C., 519 Bayev, A. A., 156 Baylor, D. A., 35

Beadle, P. C., 244 Becher, B., 36, 41, 42, 53 Becher, B. M., 37 Becker, E. D., 167, 543, 548 Becker, J., 403 Becker, K. H., 227, 236 Becker, R. S., 44, 46, 47 Becquerel, E., 189 Bedeaux, D., 465 Beer, M., 269 Beevers, R. B., 523, 525, Beezer, A. E., 160 Begley, R. F., 432-34 Belikova, G. S., 425 Belin, M., 117, 119, 120, 124, 129, 135 Bell, S., 392 Bemand, P. P., 237 Benbow, R., 288 Bender, H. J., 172 Benesi, H. A., 26 Beni, G., 205 Benko, B., 180 Benner, C. L., 530 Bennett, A. J., 121 Bennett, J. C., 214, 216 Bennetto, H. P., 167 Benoit, H., 522 Benoit-Guyot, N., 228, 230, 236, 238, 241 Ben Reuven, A., 537 Bensasson, R., 49 Ben-Shaul, A., 59-65, 67, 74, 75, 77, 79, 85, 86 BENZIGER, J., 285-306; 291, 295, 297, 298, 300 Berden, J. A., 309, 310, 328, 329 Berendsen, H. J. C., 178, 179, 181, 182, 309, 526 Berg, R. L., 147 Berg. V., 172 Berger, R. L., 160 Berger, S., 44 Berglund, B., 404 Bergman, A., 430 Bergman, J. G., 425, 497, 504, 505 Bergman, J. G. Jr., 505 Berlin, T., 17 Berman, H. A., 175 Berman, H. M., 342 Berman, P. R., 429, 555 Bernal, J. D., 519 Bernard, D. J., 199, 201 Bernasek, S. L., 296 Berne, B. J., 85, 449, 450, 465, 466

Bernier, P., 172 Bernstein, H. J., 41, 318, 320 Bernstein, R. B., 59-65, 67, 69-72, 74-77, 79-85, 226 Berrondo, M., 85 Berry, G. C., 530 Berry, M. J., 60, 61, 63, 67, 75, 76, 81, 82 Bertagnolli, H., 463 Bertucci, S. J., 450, 453, 465 Beste, L. F., 529, 530 Bethea, C. G., 426 Beveridge, D. L., 19 Bianchi, E., 529 Bigeleisen, J., 445 Billing, G. D., 72 Biltonen, R., 141-43, 145, 148-50, 152-54, 157, 158, 160, 162 Bingham, R. C., 19 Binkley, J. S., 21 Biraben, F., 429 Bird, P. F., 226, 228, 229 Birdsall, N. J. M., 307-9, 318, 323-29, 331 Birely, J. H., 77 Birge, R. R., 44, 51 Birge, R. T., 14 Birrell, G. B., 318 Bitensky, M. W., 34 Bjorkholm, J. E., 434 Bjorklund, G. C., 434 Black, C., 237 Black, W. B., 529 Blais, N. C., 72, 78 Blake, J. A., 230 Blake, R. D., 345 Blakely, D. W., 286, 296, 303 Blaney, B. L., 27 Blasie, J. K., 35, 323, 329 Blatz, P. E., 37, 44, 46 Blaurock, A. E., 36, 37 Bleich, H. E., 401 Blevin, W. R., 507 Blicharska, B., 179, 180 Blinc, R., 403, 404, 499, 514 Blint, R. J., 363, 389, 390 Bloch, F., 480, 538 Bloembergen, N., 422, 423, 425, 427, 429, 430, 433, Bloom, M., 314-16, 318-20 Blum, L., 456, 462, 463 Blume, A., 153, 158 Blumstein, A., 531 Blumstein, R. B., 531

Blyholder, G., 287, 289 Bobrowicz, F. W., 389 Bocarsly, A. B., 202, 205, 214 BOCIAN, D. F., 307-35 Boddy, P. J., 190, 199 Bode, W., 153 Boden, N., 401 Boesl, U., 430 Bogan, D. J., 63, 75, 79, 86 Boggs, J. E., 385, 537, 553 Bogomolni, R. A., 36, 41-43, 45 Bokris, J. O'M., 205, 207, 209, 210, 212 Bolen, D. W., 145 Bolen, W. A., 159 Bolton, P. H., 344-46, 348, Bolts, J. M., 196, 202, 205, 209, 214, 215 Bonch-Bruevich, A. M., 428, 429 Bond, G. C., 124 Bonora, G. M., 102, 103 Bonting, S. L., 34 Bonzel, H. P., 286, 288, 301, Boots, H. M. J., 465 Boquillon, J.-P., 433 Bordeaux, D., 497, 514 Borer, P. N., 344 Boreskov, G. K., 292, 301 Borgstrom, B., 152 Borkowski, E., 527 Born, M., 4 Bornarel, J., 497, 514 Bothner-By, A. A., 179 Bottcher, C., 542 Böttcher, C. J. F., 466 Botter, B. J., 487 Boublik, T., 445 Bouchriha, H., 493 Boudart, M., 302 Bovey, F. A., 95, 100, 342 Bowen, D. K., 255 Bower, W. M., 124, 126, 127, 129, 130, 133, 135 Bowker, M., 289, 294 Bowman, J. M., 75 Bowman, N. S., 171 Bownds, D., 38 Boyce, J. J., 34 Boyd, R. K., 227, 228, 231, 232 Boyd, R. N., 160 Boyle, J. W., 244 Boys, S. F., 3, 18, 23, 24 Bozio, R., 118

Bozso, R., 289

Brack, A., 96, 97, 101-3 Bradbury, A., 401, 405 Bradbury, J. H., 519, 522, 523 Brahms, J., 96, 97, 101-3 Brahms, S., 96, 97, 101-3 Brailsford, A. D., 122 Braithwaite, M., 72 Braithwaite, M. J., 292 Brame, E. G. Jr., 167 Brandon, D. G., 255 Brandts, J. F., 156, 158 Brattain, W. H., 189 Braun, H., 156 Braun, M., 209 Breckenridge, W. H., 74, 80 Bredikhin, V. I., 428 Breiland, W. G., 487 Brennan, T., 344 Brenner, H. C., 487 Brenner, S. L., 519 Breshears, W. D., 72, 79, 226, 228, 229 Breslauer, K. J., 154 Brewer, C. F., 179 Brewer, H. B., 332 Brewer, R. G., 424, 488, 537, 555 Bridge, M. E., 288 Briegleb, G., 26 Brienza, A. R., 227 Britt, C. O., 553 Brittain, A. H., 537, 543, 545, 548, 553 Brittin, W. E., 182 Britton, D., 227, 228 Brnjas-Kraljević, J., 180 Broadhurst, M. G., 502-4, 509, 511 Broden, G., 288 Broekaert, P., 315, 398 Brooks, P. R., 79, 80 Brooman, E. W., 205 Brophy, J. H., 63, 79 Brot, C., 450, 456 Brown, A., 159 Brown, H. D., 160 Brown, J. H., 236 Brown, M. F., 158, 332 Brown, N. M. D., 124, 129, 134 Brown, P. K., 39 Brown, R. D., 179 Brown, R. L., 226 Brown, R. S., 346 Brown, S. R., 537-39, 544, 546, 553 Brown, W. G., 19-22

Browne, J. M., 273

Brownstein, K. R., 182 Brucker, C. R., 288, 292 Bruckman, P., 46, 51, 52 Brumer, P., 79 Brumori, M., 150, 151 Bruner, T., 71 BRYANT, R. G., 167-88; 523, 526, 528 Bucaro, J. A., 450 Buchdahl, R., 403, 405-7 Buchman, P., 507 Buenker, R. J., 23, 364 Buffington, L. A., 111 Buge, H.-G., 432 Bujaiskl, R. L., 403 Bullitt, M. K., 79 Bunker, D. L., 236, 243, 245 Bunkin, A. F., 434 Bur, A. J., 530 Burak, I., 82 Burcat, A., 239 Burch, D. S., 236 Burgar, M., 403 Burke, D. C., 38 Burke, P. J., 177 Burland, D. M., 488, 490 Burnell, E. E., 314-16, 318-20, 327 Burnham, A. K., 453, 465, 466 Burns, G., 227-31, 234, 235 Bursill, L. A., 267 Burstein, E., 117, 120, 126 Burton, J. J., 287, 288 Burum, D. P., 298, 402 Busch, G. E., 47, 49, 52, 53 Buseck, P. R., 260, 276 Bush, C. A., 112 Buss, V., 22 Butcher, P. N., 423, 425, 427 Butler, M. A., 194, 196, 197, 204, 209, 212 Byer, R. L., 432-34 Byers, G. W., 46

C

Cabani, S., 147, 148
Cabello, A., 63, 79
Cade, P. E., 17
Cadman, P., 237
Cagnac, B., 429
Cahen, Y. M., 177
Cam, J. W., 523
Cailla, H. L., 34
Cain, J. E., 35, 329
Caldin, E. F., 167
Callender, R. H., 37-39, 41, 42, 45, 46, 48-50, 53

Calvin, M., 211 Campbell, I. D., 349 Campbell, I. M., 223, 226, Campbell, J. H., 450 Campion, A., 41, 53 Candea, R. M., 209 Canet, D., 177 Cantor, C. R., 360 Capiomont, A., 497, 514 Capparelli, A. L., 172 Carbonell, R. G., 231 Cardillo, M. J., 295 Cardon, F., 195-97, 199, 201, 209 Carenco, A., 425 Carey, J. H., 205, 209 Cariello, L., 151 Carlson, T. A., 10 Carneiro, K., 449, 450, 462, 464, 465 Caroli, C., 122 Carreira, L. A., 434 Carrier, G., 232 Carrington, A., 167 Carrington, T., 60 Cartier, P. G., 289, 293 Case, D. A., 60, 74, 84 Cashion, J. K., 286 Casleton, K. H., 537 Cassel, R. B., 147 Cassim, J. Y., 37, 96, 101 Castellano, S. M., 322 Castleman, A. W., 237 Castro, C. H., 209 Castro, G., 493 Catterick, T., 286 Causar, R. A., 160 Cavanaugh, J. R., 181 Cebra, J., 150 Ceccorulli, G., 156 Cederbaum, L. S., 10 Center, R. E., 236 Cerretti, D., 159 Cesari, M., 526 Cesaro, A., 151 Chabay, I., 434 Chabre, M., 35, 36 Chader, G. J., 34 Chai, Y. G., 191, 213, 214 Chakrabarti, B., 111 Chalek, C. L., 63, 75, 81, 82 Chan, A., 100 CHAN, S. I., 307-35; 309, 310, 313-20, 322-26, 328-32 Chan, W., 37, 38, 44, 47, 51 Chance, B., 42 CHANDLER, D., 441-71; 442, 443, 445-52, 456, 457, 459-

62, 465-67, 469 Chandra, A. K., 17 Chandrasekhar, B. S., 124, 126, 135 Chang, A. L. J., 273 Chang, C. H., 269 Chang, D. T., 227, 228, 231, 232 Chang, H. W., 227, 229 Chang, J. S., 237 Chang, K. C., 214, 215 Chantani, Y., 504 Chapman, D., 307-9, 318, 323, 328, 329, 331 Chapman, G. E., 181 Chapman, I. D., 134 Chapman, S., 66 Charvolin, J., 308, 309, 311, 314 Chatt, J., 26 Chattopadhyay, S. K., 160 Chaux, R., 433 Chebotayev, V. P., 425, 429, 430 Chemla, D. S., 425, 426 Chen, G. C., 111 Chen, K., 430 Chen, Y. S., 35, 36 Cherns, D., 267 Cherry, R. J., 37 Chien, K. R., 537 Chien, M., 527 Chieux, P., 463 Childers, R. F., 332 Chirgwin, B. H., 20 Chlebowski, J. F., 156 Choo, K. Y., 243, 244 Choquette, M., 154 Chow, C., 403 Christensen, J. J., 143 Christmann, K., 286, 288-96, 301 Chrzeszczyk, A., 322 Chujo, R., 45 Church, G. M., 346 Ciana, A., 151 Ciferri, A., 529 Clark, B. F. C., 337 Clark, J. A., 244 Clark, L. B., 98 Clark, W. D. K., 191, 211 Clarke, J. H., 452, 462 Clavenna, L. R., 288 Clechet, P., 203, 209 Clementi, E., 23, 26 Clendering, C., 73, 86 Clough, S. B., 531 Clyne, M. A. A., 223, 227, 236, 237 Cockayne, D. J. H., 276

Coffin, D., 529 Cohen, D., 209, 214-16 Cohen, M. H., 403, 404 Cohn, M., 344-46, 358 Cole, A. G., 153 Cole, M., 269 Cole, P. E., 345, 356 Coleman, R. V., 124, 129, 134, 135 Colley, S., 129 Collins, D. M., 291, 302 Colosimo, A., 150, 151 Colussi, A. J., 236, 244 Combescot, R., 122 Comrie, C. M., 288, 293, 301 Cone, J., 143 Cone, R. A., 32-34, 36 Connick, R. E., 490 Connor, J., 236, 237 Connor, J. N. L., 67, 75, 86 Conrad, H., 288, 291, 298 Conti, G., 147, 148 Converse, C. A., 37, 39, 49, 52, 143, 144, 159 Cook, G. B., 3, 18, 23 Cooke, R., 178 Cookingham, R., 39 Coolidge, A. S., 3 Coombe, D. A., 542 Cooper, A., 37, 39, 49, 52, 143, 144, 159 Cooper, D. E., 488 Cooper, R. B., 359 Cordes, E. H., 332 Cotter, M. A., 519 Cotton, F. A., 25, 27, 167 Coulson, C. A., 8, 18-22, 24 Covington, A. K., 175 COWLEY, J. M., 251-83; 254, 255, 257-62, 272, 273, 275-77, 279, 280 Cox, R. A., 237 Coy, S. L., 539, 542, 545, 546, 549, 550, 553, 555 Craig, D., 475 Craig, R. A., 205 Craighead, K. L., 174 Cramer, F., 156, 351, 354 Cramer, S., 434 Crane, G. R., 425, 497, 504, 505 Crawford, B. L., 18 Crawford, M. K., 184 Crescenzi, V., 151 Creswell, R. A., 537, 539, 553 Crewe, A. V., 253, 261, 262, 269 Crim, F. F., 63, 72, 79

Cross, D. R., 202, 209 Cross, V. R., 398, 410 Crothers, D. M., 345, 346, 356, 360 Crouch, R., 37, 38, 41, 44, 47, 51 Crouser, L. C., 115 Cruse, H. W., 63, 81, 82 Crystal, R. G., 508 Cullis, A. G., 269 Cullis, P. R., 309, 310, 319, 327-29 Cummins, P. G., 205 Cunningham, A. C., 407 Cunningham, S. L., 118, 130 Curatolo, W., 319 Curran, A. H., 223 Curtiss, L. A., 23 Cusanovich, M. A., 37, 39, Cvetnović, R. J., 236, 239, 244 Cyvin, S. J., 435 Czerwon, H. J., 85 Czworniak, K. J., 450

D

Dadok, J., 179 Daemen, F. J. M., 34, 49, Dagdigian, P. J., 60, 63, 64, 71, 74, 76, 81, 82, 86 Dagg, L. R., 537, 539 Dahlquist, F. W., 309, 322 Dailey, B. P., 402 Dalling, D. K., 44 Damadian, R., 176 Daniel, W. E. Jr., 344, 345, 358 Daoust, H., 154 Dark, A., 323 Darszon, A., 34 Das Gupta, D. K., 507 Date, M., 527 Dauber, P., 48 Daune, M., 522 Davenport, J., 118 Davis, D. D., 236, 239 Davis, D. G., 328 Davis, L. C., 122 Davis, R. E., 237 Davydov, A. S., 474, 488, 489 Davydov, B. L., 425, 426 Dawidowicz, E. A., 326 Day, G. W., 507 Day, S. M., 407 Daycock, J. T., 323 Dean, A. M., 239 DeBoer, E., 402

deBoer, J. H., 124 deCheveigne, 117 Decius, J. C., 435 Deckelbaum, R. J., 157 Defourmeau, D., 117, 119, 120, 124, 129, 135 DeFries, T., 176, 451, 454 DeGennes, P. G., 519, 527 de Graff, B. A., 227, 228 Degrip, W. J., 37 DeGryse, R., 195 de Haas, N., 239, 240 Dekkers, N. H., 261 DeKruijff, B., 329 Delaage, M. A., 34 DeLang, H., 261 Delmelle, M., 36 de More, W. B., 237 Demuth, J. E., 292 Dencher, N. A., 37, 43 Der, R., 85 Derbyshire, W., 181, 183 Derrington, C., 209 Derrington, C. E., 209 Derwent, R. G., 237 Desnoyers, J. E., 142, 145, 147, 148 Desplat, J. J., 209 Desrosiers, N., 145 Deutch, J. M., 447, 451, 466 Devaux, P., 327 Devaux, P. F., 34 Deverell, C., 173 deVisser, C., 146, 147 deVries, A., 531 deVries, H., 525, 528 Dewald, J. F., 190, 195, 199 Dewar, M. J. S., 19, 20, 26 Dewhurst, P. B., 37 Deželić, G., 180 DeZwaan, J., 450 Dicke, R. H., 537, 544, 545 Dicker, A. I. M., 487 Dickinson, J. T., 301 Dickman, S., 359 Diegel, J. G., 182 Diehl, P., 167 Diestler, D. J., 231 Dijkerman, H. A., 537, 539 Dill, J. F., 450 DiMarco, A., 151 DiMarzio, E. A., 519 Dimpfl, W. L., 63, 79 Ding, A. M. G., 60, 63, 64, 72 Dinur, U., 45, 46, 63, 64, 75, 76, 81, 82, 84 Dirheimer, G., 345 Ditchfield, R., 23, 402 Dixon, D. A., 385

Dixon-Lewis, G., 226, 229, 236 Dlott, D., 485, 492 Dmitriev, J. I., 180 Doane, J. W., 313 Dobbs, G. M., 545-47, 554, 555 Dobosh, P. A., 19 Dobson, C. M., 349 Dogonadze, R. R., 199 Dohany, J. E., 505 Domcke, W., 10 Donaldson, E. E., 289 Donnay, G., 276 Donnay, J. D. H., 276 Donner, J., 152 Donovan, J. W., 157 Donovan, R. J., 223 Dore, J. C., 452, 458, 461, 462, 464 Dorfman, L. M., 239 Doty, P., 519, 522, 523 Doug, A., 531 Doughty, K., 507 Douglas, A. S., 18 Douglas, D. J., 60 Doukas, A. G., 37-39, 41, 42, 45, 46, 49, 53 Dove, J. E., 233 Dover, S. D., 340 Dowell, W. C. T., 267 Downer, N. W., 35, 39 Doyen, G., 287, 289, 290 Drake, A. F., 96-98, 100 Drakenberg, T., 332 Dransfeld, K., 512 Drapatz, S., 72, 85 Dratz, E. A., 32, 34, 35, 46, 158, 332 Dreizler, H., 537 Dresner, J., 214 Dresser, M. J., 295, 300 Drucker, R. P., 431 Druet, S. A. J., 433 Drweir, R. D., 71 Drysdale, D. D., 223, 226, 236, 238, 239, 245 Ducros, R., 292 Duff, J. W., 66, 79 Dufourcq, J., 329 Duke, C. B., 117, 118, 120-22 Duke, G., 476 Duke, R. W., 526, 527 Dukert, A. A., 505 Duncanson, L. A., 26 Duncanson, W. E., 18 DuPre, D. B., 526, 527 Dutoit, E. C., 195, 196, 209 Dutton, M. L., 236, 243

Duxbury, J., 223, 236, 238, 239, 245 Dwek, R. A., 180, 342 Dybowski, C. R., 402, 409, 415 Dye, J. L., 177

Dymond, J. H., 449

Eades, R. G., 401, 405 Eastman, D. E., 286, 287 Eaton, W. A., 152 Eatough, D. J., 143 Ebrahim, N. A., 239 Ebrey, T. G., 32-34, 36-39, 41-53 Eckert, J. A., 191 Eckhardt, G., 431 Edidin, M., 319, 327 Edmiston, C., 24, 25 Edmonds, T., 292 Edsall, J. T., 162 Edzes, H. T., 182 Eesley, G. L., 435 Efimov, E. A., 190, 199 Efremov, G. D., 180 Eftink, M., 148, 150 Egelhoff, W. F. Jr., 292, 300, 301 Egelstaff, P. A., 448, 463, 464 Eibschutz, M., 209 Einstein, T. L., 292 Eisinger, J., 360 Ekkers, J., 545, 548, 550-55 Elleman, D. D., 398, 401, 402, 410, 411, 414, 415 Ellett, J. D. Jr., 398 Elliott, A., 526 Elliott, A. E., 519 Elliott, D., 211 Ellis, A. B., 191, 203, 204, 209, 214-16 Ellis, D. E., 287 El-Sayed, M. A., 41, 53, 431, Elyashevich, G. K., 525 Emrich, H. M., 39 Emsley, J. W., 167, 173 Endoh, H., 252, 260 Engel, T., 301, 302 Engelhart, H. A., 301 Englander, S. W., 35, 39 Englman, R., 67 Engstrom, S., 175 Erickson, L., 158 Erickson, N. E., 286, 300 Eringen, A. C., 526 Erler, K., 236-38

Erlich, G., 286 Ermler, W. C., 5, 12, 13, 15-18, 22, 23 Ern, V., 493 Ernst, R. R., 409, 410, 551 Ertl, G., 285, 287-96, 298, 301, 302 Erusalimchik, I. G., 190, 199 Esherick, P., 431 Estrup, P. J., 287, 288 Etoh, T., 279 Eu. B. C., 68, 71, 73 Evans, E., 118 Evans, W. H., 363 Everett, G. A., 337 Everse, J., 160 Ewing, G. E., 27, 444 Eyal, M., 82 Eyer, A., 537 Eyre, J. A., 239

F

Fabelinsky, V. I., 434 Fabian, H., 431 Fager, R. S., 34, 45, 47 Faist, M. B., 63-65, 74, 75, 79-81 Falconer, J. L., 288, 289, 291, 295, 298 Fanconi, B., 154 Fang, H. L. B., 431 Fankuchen, I., 519 Farnsworth, H. E., 285 Farrar, T. C., 167, 543, 548 Fasman, G. D., 521 Fatuzzo, E., 499 Faubel, M., 63 Fauconnet, A., 117, 124 Faulkner, T. R., 38 Fayer, M. D., 477, 480, 485, 487, 488, 491, 492 Feeney, J., 167, 329 Feigenson, G. W., 309, 314, 318-20, 323-25, 330 Feinberg, M. J., 15 Feinleib, S., 95, 100 Fejes, P. L., 259 Felderhof, B. U., 465 Ferretti, A., 197, 209 Ferry, J. D., 522 Fetters, L. J., 530 Feuchtwang, T. E., 122 Feuillade, C., 544 Feynman, R. P., 17, 538, 539 Field, D., 236-38 Fields, P. M., 275

Figueroa, D. R., 398 Filas, R. W., 526, 528 Filimonov, V. V., 142, 143, 156, 157 Fillers, J. F., 529 Finch, E., 451 Finegold, L., 154 Finer, E. G., 318 Fink, T. R., 154 Finney, J. L., 178 Finney, R. J., 450 Firkins, E., 172 Fischer, I., 8, 22 Fischer, S., 67 Fischer, S. F., 68, 450 Fisher, C. H., 79 Fisher, H. F., 151, 159 Fisher, J. F., 450 Fisher, M., 44, 45 Fisk, G. A., 63, 72, 79 Fitzpatrick, J., 74, 80 Flautt, T. J., 314 Fletcher, R., 23 Fletcher, R. T., 34 Flogel, M., 149 Flook, A. G., 318 Florkowski, Z., 179 Flory, P. J., 325, 519, 523, 526, 528 Flossdorf, J., 152 Fluck, E., 167 Flygare, W. H., 450, 452, 453, 465, 537-40, 542-48, 550-55 Flytzanis, C., 423, 425 Foldi, V. S., 529 Fontijn, A., 236 Foon, R., 227, 236, 244 Forbes, F. F., 95 Ford, L. W., 231 Foreman, I. M., 170, 181 Foreman, P. B., 537 Formanek, H., 269 Forst, W., 233 Förster, T., 479 Foster, J. M., 23, 24 Foster, K. R., 182 Fourrier, M., 537 Fowler, R. H., 123 Francis, A. H., 474, 483 Frank, J., 259 Frank, S. N., 202, 201, 212 Franks, F., 147, 178 Franks, N. P., 329 Fransen, M. R., 49, 50 Freed, K. F., 67 Freedman, T. B., 38, 49 Freire, E., 143, 145, 150, 153, 154, 157, 158 French, M. J., 436

Frenkel, J., 473 Frenkel, L., 546, 555 Frenkel, S. Y., 525 Fresco, J. R., 346 Fresco, R., 345 Frese, K. W., 209 Freund, L., 522 Freund, T., 190, 199, 201 Freundlich, H., 519 Friedland, J., 152 Friedman, H. L., 168, 176 Friedrich, D. M., 427, 428, 430 Frischleder, H., 158 Frohlich, D., 428 Froitzheim, H., 286, 287, 297 Fujihira, M., 211 Fujishima, A., 190, 191, 196, 197, 201, 203, 211, 214, 217 Fujita, H., 522 Fukuda, E., 512, 516, 527 Fukuzawa, T., 527 Fuller, W., 340 Fung, B. M., 176, 526 Fung, K. H., 67 Furuno, S., 253 Furuyama, S., 236, 244 Fury, M., 176, 450

0

Gaber, B. P., 179, 318, 320 Gadzuk, J. W., 115 Gaedtke, H., 239, 244 Gaffney, B. J., 311, 318 Gaffney, J. S., 244 Gajnos, G. E., 154 Galanin, M. D., 428 Galica, J., 537 Gallet, B., 531 Galley, H. U., 403 Gallus, G., 475, 485 Gally, H.-U., 309, 310, 328-30 Gambetta, R., 151 Gangloff, J., 345 Ganguli, P. S., 227, 228 Gardiner, W. C., 84, 239, Gardiner, W. C. Jr., 85 Garrett, C. G. B., 189 Garroway, A. N., 182, 403, 405-7 Gaspar, P. P., 243 Gasparoux, H., 519 Gass, D. M., 450 Gattermann, H., 430 Gaud, H. T., 143, 150, 151 Gaw, J. E., 35

Gawinowicz, M. A., 37, 46 Gaydon, A. G., 14 Gedanken, A., 96-98, 100 Geerdes, H. A. M., 344 Geiger, A., 171, 175 Geiger, A. L., 124, 126, 135 Gelbwachs, J. A., 429, 430 Genack, A. Z., 488 Genkin, V. N., 428, 430 Gent, M. P. N., 309, 323, 324, 331 George, E. P., 183 Gerace, L. S., 526 Gerace, M. J., 526 Gerber, R. B., 67, 81 Gerischer, H., 190, 191, 193, 195, 199-201, 204, 205, 208, 211, 213, 214 Gerlof, P. A. M., 172 Gerlt, J. A., 159 Germer, L. H., 285 Gerrard, W. A., 214 Gersonde, K., 143, 150 Gerstein, B. C., 402, 403, 406, 407, 409, 415 Gerstner, M. E., 202, 211 Gethin, A., 236 Ghormley, J. A., 244 Ghosh, A. K., 209, 212 Giancotti, V., 151 Giannessi, D., 147 Giardina, B., 150, 151 Giaver, I., 120 Gibbs, J. H., 314, 519 Gibby, M. G., 328, 398, 401, 409, 410 Gierke, T. D., 466 Gierszal, S., 537 Glessner-Prettre, C., 344 Gilardi, R. D., 44 Gilbert, D. B., 146 Gill, D., 37, 45 GILL, S. J., 141-66; 143, 145-47, 150, 151 Gillespie, D., 85 Gillespie, H. M., 223 Gillies, D. C., 177 Ginley, D. S., 191, 194, 203, 209 Girardet, J.-L., 318-20 Gires, F., 435 Girlando, A., 118 Gissler, W., 209 Gjønnes, J., 267, 275 Gjostein, M. A., 288 Glänzer, K., 236-40, 244, 945 Glass, A. M., 505, 511 Glavnik, S., 151

Gleichmann, S., 158 Gleria, M., 196, 201 Glickson, J. D., 179 Glodz, M., 431 Glorieux, P., 538, 544-48, 550, 551, 555 Go, Y., 528 Gobrecht, J., 214 Gochanour, C. R., 488 Goddard, J. P., 337, 342 GODDARD, W. A. III, 363-96; 9, 363, 364, 371, 380, 390, 391 Godek, W., 209 Godek, W. S., 209 Godici, P. E., 323, 324, 326, 331, 332 Goebel, K. D., 522-24, 526, 528 Göeppert-Mayer, M., 19, 427 Goff, S. P., 37 Goldberg, R. N., 143, 159-61 Goldburg, W. I., 410 Golden, D. M., 237, 244 Golden, S., 60 Goldflam, R., 71 Goldman, M., 167, 398 Goldman, S., 445 Goldschmidt, C. R., 39, 42, 49, 53 Goldsmith, M., 176 Goldstein, H., 403 Goldsworthy, F. A., 226, 229, 236 Gole, J. L., 63, 75, 81, 82 Golomb, D., 236 Golovei, M. P., 425 Gomer, R., 191, 195-97, 288 Gomes, W. P., 190, 195, 196, 199, 201, 209 Gonzalez Urena, A., 63, 79 Good, V. H., 529 Goodchild, D. J., 255 Goodman, D. W., 288, 289, 297, 300 Goodman, P., 267, 280 Goodman, R., 209 Gordon, R. G., 60, 450 Gordon, R. J., 66, 78 Gordon, S., 237 Goridis, C., 34 Goring, H., 158 Gösele, U., 493 Goss, L. P., 434 Goto, M., 273, 274 Gould, G., 344 Gounder, R. N., 531 Gourgand, S., 211 Govindjee, R., 37, 38, 41, 44, 47, 51, 53

Goymour, C. G., 287, 292, Grabiner, F. R., 79, 80 Granell, P. K., 401 Grant, D. M., 44, 359 Grant, S., 223, 236, 238, 239, 245 Gray, C. G., 467 Gray, C. N., 226 Gray, D. G., 530 Gray, G. W., 519, 527 Grazhulene, S. S., 425 Green, B., 49, 50 Green, M., 190, 199 Green, P. J., 403 Green, S., 66 Greenberg, A. D., 45, 46 Greenberg, J. B., 226, 229, Greenberg, M. S., 175 Greene, E. F., 72 Greengard, P., 159 Greenler, R. G., 115 Greer, W. L., 479 Gregory, D. P., 190 Griffin, O. H., 307, 311, 318 Griffin, R. G., 328, 329, 397, 402-4, 406-9 Griffiths, J. E., 466 Groff, R., 493 Grösch, L., 179 Grosjean, H., 360 Gross, K. P., 96-98, 100 Groth, W., 236 Grove, A. S., 124 Grover, J. R., 63, 75 Grover, M., 479 Grunze, M., 289 Grupe, R., 158 Grynberg, G., 429 Guarnieri, A., 537 Gubbins, K. E., 441, 445, 451, 452, 456, 467 Guberman, S. L., 15 Gueron, M., 346, 356, 357 Guillot, C., 292 Gulrich, L. W., 529, 530 Gunning, T. H. Jr., 363, 391 Gupta, R. K., 286 Gurel, H., 537 Gustafson, T., 287 Gutfreund, H., 162 Gutmann, V., 175 Gutowsky, H. S., 319 Guttler, W., 493 Guyon, E., 514

H

Haar, F., 351, 354

Haas, G. M., 191, 209 Haas, T. W., 288 Haberkorn, R. A., 403, 404, 406, 407 Haberland, H., 63, 79 Haberlandt, R., 85 Hach, R., 346 Hackerman, N., 209 Hadfield, K. L., 159 Haeberlen, U., 397, 398, 401, Hagen, D. I., 289, 296, 303 Hagerdal, B., 156 Hagins, W. A., 32-35 Hagiwara, S., 507 Hahn, E. L., 401, 410 Hahn, M. H., 269 Hair, M. L., 115, 134 Hajdo, L. E., 526 Hajduk, J. C., 233 Haken, H., 474, 476, 479, 488, 489 Halavee, U., 66, 67, 82 Hall, C. R., 255 Hall, D. S., 426 Hall, R. B., 72 Hallenga, K., 179, 180, 183 Haller, G. L., 129 Halow, I., 363 Halsey, J., 152 Halsey, J. F., 149, 157, 158 Halstead, T. K., 402 Haly, A. R., 153 Ham, D. O., 226, 227, 230, 231 Hama, K., 269 Hamanaka, T., 44 Hamill, W. D. Jr., 359 Hamilton, C. A., 507 Hamilton, J. A., 332 Hampf, W., 427 Han, H. R., 289 Hancock, T. A., 529 Handler, P., 199, 201 Handy, B. J., 236 Hanlon, S., 100 Hänsch, T. W., 427, 428, 430 Hansma, P. K., 115, 117, 122-24, 126, 129, 130, 132, 134 - 36Hansen, D. A., 237 Hansen, J. P., 441, 443, 445-47, 461, 467 Hansen, J. R., 314 Hansen, L. D., 143 Hansen-Nygaard, J., 21 Hanson, F. V., 302 Haque, S. S., 537

Hard, R., 153 Hardee, K. L., 191, 209 HARDING, L. B., 363-96; 363, 391 Hardy, J., 118, 130 Hardy, J. E., 239 Hargrave, P. A., 36 Hargraves, W. A., 147, 151 Hariya, M., 209 Harker, A. B., 236 Harland, C. J., 255 Harmon, S. A., 359 Harp, G. D., 85 Harrell, J. W. Jr., 177 Harrick, N. J., 115 Harriman, A., 44, 45 Harrington, H. W. 537, 545 HARRIS, C. B., 473-95; 474, 476-80, 483, 485-87, 490, 491, 493 Harris, G. W., 237 Harris, H. H., 236, 243 Harris, L. A., 202, 209, 211, 285 Harris, R. A., 427, 428, 430 Harris, R. K., 167, 174 Harris, S. J., 445 Harris, W. P., 504 Harrison, W. A., 120 Hart, H. R. Jr., 120 Hart, R. M., 143 Hartig, R., 238 Hartman, C. D., 285 Hartmann, S. R., 401, 410 Harvey, A. B., 432, 433 Harwood, D., 529 Hasan, F., 309, 311, 318, 319, 321-23, 326 Hase, W. L., 245 Hasegawa, R., 504 Hashi, T., 402, 404 Hashimoto, H., 252, 260, 269, 271 Hashizume, H., 508 Hatanaka, H., 404 Haubenreisser, U., 406 Hauser, H., 318 Hay, P. J., 363, 391 Hayakawa, R., 497, 501, 502, Hayashi, T., 522 Hazlett, R. N., 403, 406, 407 Heard, C. R. T., 464 Heaton, M. M., 371 Hedlund, B. E., 151 Hehre, W. J., 21, 23 Heicklen, J., 237 Heiman, D., 435 Heinzmann, R., 13

Heitler, H., 1, 8 Helcke, G. A., 181 Held, G., 179 Heller, A., 214, 215 Heller, D. F., 67 Hellmann, H., 17 Hellwarth, R. W., 423, 425, 431, 435, 538, 539 Hellwege, A. M., 497, 515 Hellwege, K.-H., 497, 515 Helman, J. S., 214 Helmminak, T. E., 530 Helms, C. R., 288, 295 Hembree, G. G., 254 Hemenger, R., 479 Hemley, R., 44, 51 Hemminga, M. A., 309, 328, Hemminger, J. C., 445 Henderson, D., 446 Henderson, R., 32, 36, 41 Hendra, P. J., 115 Hendriks, T., 34 Henesian, M. A., 434 Henley, D., 346 Henneker, W. H., 17 Hennel, J. W., 179 Henselman, R., 41, 42, 53 Henselman, R. A., 37, 39, 52 Herbst, E., 391 Herbstein, F., 480 Herlemont, F., 537 Hermann, R. B., 146 Hermans, J., 523, 524 Herrmann, G. F., 537, 545, Herron, J. T., 244 Herschbach, D. R., 60, 65, 74, 76, 82, 84 Hertel, B., 254 Hertel, I. V., 63, 74 Hertz, H. G., 168-70, 171-Herzberg, G., 5, 7, 363 Herzfeld, J., 406, 408 Hess, B., 42 Hester, R. K., 398, 409, 410 Hetherington, W. III, 434 Heumann, E., 431 Heuvelsland, W. J. M., 146, Heyn, M. P., 37 Hickok, J., 209 Hickson, D. A., 136 Hierle, R., 425 Highet, R. J., 332 Hikichi, K., 527 Hilbers, C. W., 344, 345, Hildebrand, J. H., 26

Hilden, D., 233 Hill, R. M., 537, 545, 551 Hiltner, A., 527 Hilton, B. D., 179, 181, 182, 184 Hinchen, J. J., 72, 85 Hines, R. L., 267 Hines, W. A., 526, 527 Hino, K., 260, 269, 271 Hinshaw, W. S., 407 Hinz, H., 329 Hinz, H. J., 143, 152, 153, 156, 157 Hippler, H., 227, 230, 234-36, 239, 243, 244 Hiraoki, T., 528 Hirota, E., 537, 539, 541, 542, 544, 545, 548, 549, 553 Hirsch, P. B., 253, 276, 280 Ho, W., 118 Hobbs, R. H., 72, 85 Hobson, A., 64, 65 Hochanadel, C. J., 244 Hochstrasser, R. M., 51, 423, 428, 430, 431 Hodes, G., 209, 214-16 Hodgkin, A. L., 35 Hodgson, A. R., 340 Hoduc, N. G. A., 154 Hoelke, C. W., 277 Hofacker, G. L., 59-61, 65, 67, 68, 85 Hofferbest, W. L., 529 Hoffman, K. C., 190 Hoffmann, R., 21 Höfler, F., 243 Hofmann, H., 63, 74 Hofmann, R. T., 543, 545, 548, 551, 553, 555 Hofmann-Perez, M., 196 Hofrichter, J., 152 Hogan, L. G., 236 Hogarth, W. L., 233 Højlund-Nielsen, P. E., 254 Hoke, W., 545, 548, 550, 553-55 Holbrook, S. R., 346 Holley, R. W., 337 Holm, R. H., 169 Holmes, B. E., 60, 63 Holtom, G. R., 428, 431, Holtzer, A. M., 519, 522, 523 Holz, M., 175, 176 Holzwarth, G., 105 Honda, K., 190, 191, 196, 197, 201, 203, 209, 211,

214, 217 Hong, K., 34, 36, 37 HONIG, B., 31-57; 32-34, 36-38, 42-53, 430 Honjo, G., 271 Hood, D., 34 Hooker, M. P., 288 Hopfield, J., 474 Hopkins, D. L., 44, 45, 51 Hopster, H., 115, 136, 286 Hor, D., 176 Horiuchi, S., 279 Horn, J. L Jr., 124, 126, 127, 129, 133, 135 Horn, K., 288 Horne, D. G., 223, 226, 236 Hornstra, J., 277 Horowitz, J., 358 Horrocks, W. D.-W. Jr., 169 Horsley, W. J., 309, 323, 331 Horton, W. H., 359 Horwitz, A. F., 309, 318, 319, 323, 328, 331 Hoult, D. I., 309, 328, 329 Houriez, J., 537, 546 Hovel, H. J., 213 Howie, A., 253, 267, 276, 280 Hoye, J. S., 451, 465-67 Hoyerman, K. H., 239, 243, 244 Hsi, E., 181-84 Hsu, C. S., 446, 448, 449, 451, 452, 456, 459, 461, 462, 465 Hsu, E. C., 531 Hsu, F. J., 151 Hsu, M., 318, 320 Hu, C.-M., 451 Huang, C .- H., 331 Hubbard, R., 32, 38, 39, 46, 49 Hubbell, W. L., 34-37, 307, 311, 317 Hückel, E., 3, 18 Huddleston, R. K., 85 Hudson, B. S., 43, 432-34 Hudson, J. B., 298 Hughes, D. G., 244 Huie, R. E., 244 Hukins, D. W. L., 340 Humpheries, L. J., 402 Humphries, R. L., 526 Hund, F., 5, 24 Hunklinger, S., 512 Hunsalz, G., 432 Hunt, W. J., 363, 389 Huppert, D., 47, 49

Hurd, R. E., 342-44, 346, 347

Hurley, J. B., 42, 43, 45, 47-53

Huryck, Z., 288

Hussain, M., 288

Hutchens, J. O., 153

Hutton, W. C., 331

Huzinaga, S., 23

Hwang, L. P., 168, 176

Hwang, S., 42, 43

Hynes, J. T., 441, 451

I

Ibach, H., 115, 136, 286, 287, 297 Iehiki, S. K., 537, 545, 551 Iden, C. R., 63, 75 lijima, S., 264, 265, 267, 269, 271-74, 276, 277, 280 lizuka, E., 526, 527 Ikeda, S., 522 Ikegami, A., 318 Ingraham, L. L., 46 Ino, S., 254 Inomata, S., 431 Inoue, T., 214 Inoue, Y., 45 Ip, J. K. K., 227-29 Irving, C. S., 46 Irwin, R. S., 244 Isaacson, M. S., 255, 261, 269, 270 Isenberg, I., 100, 105 Isihara, A., 519, 522 Isoda, S., 277, 278 Isozaki, S., 527 Isubomura, H., 211 Ito, M., 430, 431 Ivanov, S. G., 434 Iwakura, C., 209 Iwase, M., 211 Iwase, T., 211 Izatt, R. M., 143 Izui, K., 253

J

Jack, A., 340, 346
Jackson, A. G., 288
Jackson, J. M., 60, 85
Jackson, L. M., 167
Jackson, M. B., 158, 313
Jackson, W. J., 531
Jackson, W. M., 156
Jacobson, A. L., 156
Jacobson, J. D., 443
Jacobson, K., 327
Jaeger, R., 295

Jaenicke, R., 153 Jagger, W. S., 36 Jaklevic, R. C., 117, 119-21, 124, 129, 130, 135 Jakubetz, W., 67, 75, 86 James, H. M., 3 James, P. G., 526 James, T. L., 180, 183, 307-9, 318, 323, 326, 328, 331, 332 Jan, L. Y., 35 Janda, K. C., 445 Janes, G., 160 Jansen, P. A. A., 49, 50 Janssen, A. P., 255 Japaridze, G. S. H., 153, 154 Jarmain, W. R., 14 Jarrett, H. S., 197, 209 Jaspars, E. M. J., 153 Jasperson, S. N., 96 Javan, A., 555 Jayadevaiah, T. S., 214 Jayanty, R. K. M., 237 Jaynes, E. T., 64-66 Jeener, J., 315, 398 Jeffers, P., 233 Jencks, W. P., 162 Jenkins, J. L., 551 Jenness, D. D., 102-4 Jennings, K. R., 243 Jennings, R. J., 120, 129 Jensen, C. C., 70 Jentoft, J. E., 181, 182 Jerphagnon, J., 425, 426 Jetter, H., 544, 547, 555 Johnson, B. R., 63, 75, 79 Johnson, C. D., 227, 228 Johnson, K. H., 20 Johnson, P. D., 344, 349, Johnson, P. M., 429-31 Johnson, R. E., 160 Johnson, R. S., 100 Johnson, S. W., 286, 291, 299 JOHNSON, W. C. JR., 93-114; 95, 96, 100-10, 112 Johnston, H. S., 236 Johri, G. K., 537 Jolicoeur, C., 172 Jona, F., 499 Jonas, J., 176, 450, 451, 453, 454 Jones, C. R., 344, 360 Jones, D. G., 233 Jones, D. R., 450 Jones, E. D., 431 Jones, H., 537 Jones, K. E., 488

Jones, M. N., 151 Jones, P. F., 429, 430 Jones, W. J., 431 Jonkman, H. T., 23 Joosten, H. P. G., 72, 79 Jordan, R. B., 176 Jortner, J., 430 Jost, P., 307, 311 Jouve, M., 514 Joy, D. C., 255 Joyce, B. A., 255 Joyner, R. W., 288, 292, 299 Jug, K., 20 Jugé, S., 514 Jula, M. R., 152 Just, T., 236, 238

K

Kafalos, J. A., 203, 209 Kafri, A., 63, 65, 67, 70, 73-76, 78-81, 83 Kafri, O., 59, 61, 85 Kahana, P., 71 Kahng, D., 190, 199 Kainosho, M., 315, 322, 323, 326 Kaiser, S. W., 202, 203, 209, 214, 215 Kajimoto, O., 239 Kakar, R. K., 537 Kakitani, T., 46, 51 Kakudo, M., 44 Kalelkar, A., 232 Kalisky, O., 42, 44, 45, 47, 53 Kalk, A., 179 Kallenbach, N. R., 342 Kallend, A. S., 236 Kalman, E., 464 Kalmykova, V. D., 529, 530 Kamashima, K., 527 Kambe, K., 266 Kan, L. S., 344, 351, 354 Kaneko, M., 527 Kanke, M., 527 Kano, S., 537 Kapili, L., 269 Kaplan, D. E., 537, 545, 551 Kaplan, H., 59-62, 71-73, 75-77, 79, 80, 82, 84 Kaplan, M. W., 36 Kaplan, N. O., 160 Kaplan, S. R., 42 Karasz, F. E., 154 Karle, I. L., 44 Karle, J., 44 Karnicky, J. F., 462 Karo, A. M., 13

Karplus, M., 32, 38, 43, 44, Karplus, R., 538 Kasdan, A., 391 Kaska, W. C., 135 Kastrup, R. V., 351-53 Kasuga, T., 547, 548, 553 Kasuya, T., 541 Katerbau, K.-H., 254 Kates, M., 41 Katto, T., 530 Katz, J. A., 446 Katz, L., 342 Kaufman, B. V., 184 Kaufman, F., 63, 75, 85, 223, 226-31, 237 Kaufman, M., 227, 236, 244 Kaufman, S., 314 Kaufmann, K. J., 53 Kauzman, W., 178 Kavesh, S., 512 Kawai, H., 504 Kawato, S., 318 Kayne, M. S., 346 Kearns, D. R., 342, 344-46, 348, 349, 360 Keck, J. C., 231-33, 65, 85 Keeney, J., 191, 209 Keil, D. G., 238 Keil, F., 385 Keirns, J. J., 34 Keller, P., 311, 497, 513, Kelley, J. D., 63, 75, 84 Kelley, R. D., 298 Kelly, M. M., 102 Kemp, J. C., 96 Kenkre, V., 479 Kennedy, J. H., 209 KEPLER, R. G., 475, 497-Kerr, J. A., 223, 243, 244 Kessler, Y. M., 174, 175 Keyes, T., 456, 465, 466 Khabibullin, B. M., 173 Khan, V. M., 205 Khe, P. V., 237 Khechinashvili, N. N., 153, Khodovoi, V. A., 428 Khoo, I. C., 230, 434 Kiamco, E. A., 530 Kiefer, J. H., 72, 79, 233, 236 Kiesow, L. A., 151 Kihara, H., 523, 525 Kijewski, H., 236, 238 Kikuchi, S., 190, 191, 201, 203, 217 Kilbride, P., 36, 37

Kilcoyne, J. P., 243 Killian, F. L., 527, 529, Kilponen, R. G., 37, 45 Kim, K., 449 Kim, K. C., 63, 72, 75, 79, 85 Kim, S.-H., 340, 346, 360 Kimel, S., 428, 431 Kimmich, R., 324, 325 Kimura, S., 273, 274 King, D. A., 115, 285-89, 292, 293 King, D. L., 63, 74, 82 King, H. H., 197, 209 Kinosita, K., 318 Kinsey, J. L., 59-65, 69, 79, 82, 84 Kirkwood, J. G., 456, 466 Kirsch, L. J., 60, 64 Kirtley, J. R., 117, 124, 126, 129, 132 Kisliuk, P., 293 Kiss, G., 527 Kitai, M. S., 430 Kitajima, H., 45, 46 Kittel, C., 502 Kivelson, D., 168, 466 Kiyohara, O., 145, 147, 148 Klauminzer, G. K., 434 Klazema, B., 143 Klein, F. S., 82, 83 Klein, I. E., 242 Klein, J., 117, 119, 120, 124, 129, 135, 432, 434 Klein, M. P., 309, 310, 318, 319, 323, 328-31, 403 Klein, O., 14 Kleir, K., 288 Klemperer, W., 445 Kley, D., 227 Kliger, D. S., 32, 44-47, 49, 428, 430, 431 Klopman, G., 14, 15 Klug, A., 340, 346 Klump, H., 153 Kneringer, G., 302 Knight, A. E. W., 430 Knox, J. R., 526 Knox, R., 479 Knyazev, I. N., 429 Ko, E. I., 291, 300 Kobayashi, K., 271, 277-79 Kobayashi, T., 47 Koch, F. A., 254 Koch, J., 288 Koch, S., 27 Koch-Schmidt, A. C., 157

Kodama, T., 151

Koehler, K. M., 351 Koenig, S. H., 179, 180, 183 Kohayaka, K., 214 Kohayakawa, K., 191, 209 Kohl, P. A., 210, 212 Kohler, B. E., 44, 51 Kohler, F., 537 Kohler, S. J., 309, 310, 328-31, 403 Kohrt, C., 288 Kolesar, D. F., 191, 203, 205, 209, 214 Köller, Th., 269 Kollman, P. A., 27 Kollman, V. H., 332 Komatsu, T., 45, 46, 51 Komatsubara, M., 522 Komoda, T., 269 Komoroski, R. A., 359 Kompa, K. L., 85 Konaga, T., 527 Konzelmann, U., 490 Koopmans, T. A., 9 Kopelman, R., 473, 493 Kopf, D., 269, 270 Koreneva, L. G., 425, 426 Kornberg, R. G., 326 Koroteev, N. I., 434 Korsch, H. J., 63, 7-76, 78-80, 84 Kosfeld, R., 167 Kosloff, R., 59, 61-63, 65, 70, 73-76, 79-83, 85 Kostelenik, R. J., 322 Kostner, M., 209 Kotovschikov, S. G., 425 Kou, L. J., 523 Koura, K., 72, 85 Kouri, D. J., 71 Kovacs, P., 464 Kovar, R. F., 530 Kraeutler, B., 212 Krakauer, H., 150, 154 Krakow, W., 267, 273 Kramer, H. M., 272 Kramer, S. D., 433 Krasinski, J., 431 Kreiner, W. A., 537 Krenos, J. R., 63 Kresheck, G. C., 147, 151 Kriebel, A., 37 Krimm, S., 105 Krishnaji, 537, 539 Krivanek, O. L., 277, 278 Kriz, H. M., 397, 403, 404 Kroeker, R. M., 130 Kroon, P. A., 315, 318-20, 322, 323, 326, 329 Kropf, A., 37, 46, 49, 50 Kruger, G. J., 181

Krugh, W. D., 227 Krynetsky, B. B., 434 Ku, R., 286, 288, 301, 302 Kubo, R., 490 Kudryavtsev, G. I., 529, 530 Kuebler, N. A., 97 Kuhfuss, H. F., 531 Kuhn, H., 34, 39 Kuiper, A. E. T., 134 Kukolich, S. G., 537, 538, 542, 545, 547, 553, 555 Kulevskii, L., 434 Kulevsky, L. A., 434 Kulichikhin, V. G., 529, 530 Kumao, A., 260, 269, 271 Kumar, A., 410, 537 Kumar, D., 537 Kung, R. T. V., 236 Kunitomo, M., 402 Kuntz, I. D. Jr., 178, 180, Kuntz, P. J., 60, 65, 76, 80 Kunz, S. D., 349 Kuo, A.-L., 327 Kuppermann, A., 75, 79 Küppers, J., 285, 288, 291 Kuriki, Y., 152 Kurkijarvi, J., 449, 450, 456, 465 Kurnit, N. A., 555 Kurtz, S. K., 426 Kusano, K., 145 Kuschmitz, B., 42 Kushick, J., 449 Kutzelnigg, W., 385 Kvavadze, K. A., 153, 154 Kwatra, B., 172 Kwolek, S. L., 529, 530

#### L

Labes, M. M., 502, 514 Lachish, U., 42 Ladanyi, B. M., 445, 448, 456, 457, 459, 461, 462, Ladbrook, B. D., 329 Ladner, J. E., 340, 346 Ladner, R. D., 364, 371, Laflere, W. H., 195, 199, 201 Lagally, M., 292 Lahajnar, G., 180 Laine, R. M., 135 Lajzerowicz, J., 497, 514 Lajzerowicz-Bonneteau, J., 497, 514 Lakatos-Lindenberg, K., 479 LaMar, G. N., 169

Lamb, T. D., 35 Lambe, J., 117, 119-21, 124, 129, 130, 135 Lambert, J. D., 69 Lambert, R. M., 288, 293, Lamola, A. A., 39, 47, 49, 52, 53 Lampe, F. W., 227 Lampton, V., 302 Land, E. J., 44, 49 Landau, L. D., 60 Lando, J. B., 505 Landry, J. D., 254 Landsberger, F. R., 323, 324, 326, 331, 332 Lang, N. C., 63, 72, 85 Langan, J. D., 122, 124, 129, 130 Langer, H., 170 Langerman, N., 142, 143, 148, 160 Langmore, J. P., 253, 255 261, 262, 269, 270 Lapanje, S., 151 Lapujoulade, J., 289, 295 Larsen, B., 452 Laser, D., 202, 212, 214 Lathan, W. A., 23 Latta, E. E., 288, 289, 291, 296, 298 Lau, A., 318, 320, 431, 432, 434 Lau, K.-F., 402 Laubereau, A., 450 Laufer, G., 434 Laurie, V. W., 545-47, 554, 555 Lauterbur, P. C., 184 Lavrovskii, N. A., 425 Lawaczeck, R., 326 Lawson, K. D., 314 Lax, M., 511 Leduc, P. A., 142 Lee, A. G., 307-9, 318, 323-29, 331 Lee, C. O., 298 Lee, H., 502, 514 Lee, J. B., 291, 302 Lee, J. W., 398 Lee, M., 410 Lee, M. W., 445 Lee, Y., 529 Leermakers, P. A., 46 Lees, R. M., 537 Lefebvre, R., 66 Legan, R. L., 554 Leger, A., 117, 119, 120, 124, 129, 135 Legg, K. D., 202, 205,

Legrand, J., 547, 550, 551, 555 Legrand, J. F., 497, 514 Lehmpfuhl, G., 266 Lehwald, S., 287, 297 Leidheiser, H., 288 Leitch, L. C., 309, 328, 331, 332 Lemaire, J., 537, 546 Lemley, A. T., 39 Lengel, R. D., 86 Lennard-Jones, J. E., 6, 20, 24 Lensi, P. L., 209 Lenz, K., 431, 432 Leonard, W. J., 523, 526, 528 LePerson, H., 426 Lepori, L., 147 Leroi, G. F., 431 Le Roy, D. J., 226 Leroy, J. L., 346 Lesclaux, R., 237 Lesslauer, W., 329 Letokhov, V. S., 425, 429 Leu, M. T., 237 Levenson, M. D., 429, 430, 434, 435 Levesque, D., 449, 464 Levich, V. G., 199 Levin, K., 160 Levine, B. F., 426 LEVINE, R. D., 59-92; 59-85, 231 Levine, Y. K., 323, 325, 331, 401 Levy, D., 453, 454, 464 Levy, J. M., 538, 542, 545, 547, 548, 553-55 Levy, M., 96, 97, 100 Lewellyn, M. T., 485 Lewis, A., 37, 39, 41, 42, 45, 53 Lewis, B. F., 124, 126, 127, 129-31, 135, 137 Lewis, D. G., 105, 106, 112 Lewis, G. N., 1 Leyte, J. C., 182, 183 Lezuis, A., 154 Li, H. J., 105 Li, K., 71, 73 Lichtenberg, D., 318-20, 329 Liebert, L., 497, 513, 514 Liebman, M., 340, 360 Liebman, P. A., 36 Light, J. C., 65 Lilenfeld, H. V., 63, 75 Lilley, T. H., 175

214-16

Lillford, P., 183 Lilyquist, M. R., 529 Lin, C. C., 554 Lin, C. L., 237 Lin, J., 231 Lin, M., 37 Lin, M. C., 63, 74, 86 Lin, S. H., 432 Lind, A. C., 398 Lindahl, T., 346 Lindblom, G., 307-9, 309, 314, 318, 327, 331, 332 Linde, J. V., 537 Lindenmayer, G., 157 Lindman, B., 173-75, 184 Lindon, J. C., 173 Lindstrom, T. R., 179 Lineberger, W. C., 391 Lines, M. E., 511 Ling, D. T., 290 Linnett, J. W., 300 Linowski, J. W., 176 Linz, A., 191, 203, 209 Lipari, N. O., 118 Lippmaa, E., 406 Lischka, H., 385 Lisle, J. B., 23 Litman, B. J., 35, 36 Litovitz, T. A., 450 Little, L. H., 115 Liu, K., 63, 75, 76, 79-82, 86 Liu, N., 176 Liu, R. S. H., 37, 44, 45 Liu, W., 539, 541, 555 Liwak, S. M., 530 Lloyd, A. C., 223, 226, 227, Lo, D. H., 19 Lobko, V. V., 429 Loeffler, D. G., 294 Loewenstein, A., 174 Loferski, J., 206, 207 Logan, J. A., 79 Logullo, F. M., 529 Lohmann, F., 193 Lombardi, J. R., 427, 428, 430 London, F., 1, 8 London, R. E., 332 Long, D. A., 435, 436 Long, M. E., 428 Longmuir, K. J., 309, 322 Longuet-Higgins, H. C., 19 Lotem, H., 433, 434 Louvrien, R., 161 Lovesey, S. W., 462 Lovrien, R., 151 Lowden, L. J., 446, 448, 449, 452, 456, 461, 462,

464, 465 Lozier, R. H., 36, 41-43, Lu, K. E., 289, 293, 294, 296 Lucadou, W. V., 63, 79 Lucchese, R. R., 391 Luck, W. A., 178 Luckhurst, G. R., 526 Ludlum, K. H., 133, 134 Lugtenberg, J., 49, 50 Luijendijk, S. C. M., 537, 539, 553 Lunder, M., 151 Lundquist, R., 359 Lundqvist, S., 117, 120, 126 Luongo, J. F., 507 Lussan, C., 329 Luther, K., 230, 234, 235, 239, 244 Lau, S. H., 230, 236 Luu, T., 124, 126, 127, 129, 133, 135 Luyten, W. C. M. M., 49, 50 Luzzati, D., 308 Luzzati, V., 35, 526 Lyman, J. L., 77 Lynch, D. F., 257, 267, 280 Lynch, L. J., 178, 183 Lynch, R. T. Jr., 433, 434 Lysko, K., 158

M

Maas, G., 354, 356 Mabrey, S., 156, 158 MacDonald, R. G., 227, 228, 231, 232 Macfarlane, R. M., 490 Maciel, G. E., 403, 406, 407 Macke, B., 538, 544, 545, 547, 548, 550, 551, 555 MacLean, D. I., 231 Madden, H. H., 288, 301 Mäder, H., 537, 545, 548, 551, 553, 555 Madey, T. E., 286, 288, 289, 295, 297, 298, 300 Madiaoski, W. M., 450 Madison, J. T., 337 MADIX, R. J., 285-306; 275, 285, 286, 288, 291, 295-302 Madov, M. J., 195, 196 Maggiora, G. M., 44 Maguire, T. C., 434

Maher, D. M., 255, 269 Mahnen, G., 236 Mahnig, M., 289 Mahr, H., 427, 428 Maier, H. N., 227 Maier, W., 526 Maillard, B., 546 Majewski, W., 431 Maker, P. D., 432, 433, 435 Makino, S., 527 Malinowski, E. R., 177 Malkin, A. Y., 529, 530 Malloy, T. B. Jr., 434 Malmberg, C. G., 504 Maloney, K. K., 236 Manassen, J., 209, 214-16 Mandel, P., 34 Mandel, R., 105 Mann, D. C., 151 Mann, D. E., 19 Manor, P. J., 543, 545, 548, Manos, D. M., 63, 75, 76, 79-82, 86 Mansfield, P., 397, 398, 401 Manz, J., 59-63, 65, 67, 70-73, 75-79, 82-86 Mao, B., 36, 37 Marantz, H., 546, 555 Marčelja, S., 312-14, 317, 447 Marcus, M. A., 53 Marcus, R. A., 65, 199, 245, 539, 541, 555 Marcus, S. M., 117, 119-24, 132 Mardh, P., 161 Margitan, J. J., 237 Maričić, S., 180, 181 Mariq, M., 406, 407 Markovska, B., 180 Marquisse, M., 337 Marsden, K. H., 183 Marshall, A. G., 358 Marshall, R. M., 244 Marshall, W., 462 Martens, H., 156 Martin, G., 435 Martin, J., 203, 209 Martin, R. B., 331 Martin, R. L., 10 Martina, E., 447 Martinot-Legarde, Ph., 514 Martire, D. E., 519 Maruska, H. P., 209, 212 Marynick, D. S., 385 Marzili, L., 269 Mason, R., 181, 182 Mason, S. F., 96-98, 100

Mason, W. T., 34

Masson, F., 526 Mateescu, G., 47 Mathies, R., 37, 38, 46, 49 Mathur, B. P., 82 Matsuda, T., 269 Matsui, Y., 279 Matsumoto, H., 37 Matsumoto, S., 507 Matsumoto, T., 522 Matsumura, M., 211 Matsune, K., 318-20 Matsushima, N., 527 Matteoli, E., 147, 148 Matthews, R. G., 39 Matthews, R. W., 177 Mattick, A. T., 555 Mattis, D. C., 205 Matwiyoff, N. A., 332 Matzen, M. K., 72, 79 Mavroides, J. G., 191, 202, 203, 205, 209, 214 May, J. W., 288, 298, 301 Mayer, G., 435 Mayumi, S., 209 Mazur, P., 465 McBride, D., 123, 124 McCabe, R. W., 288, 289, 291, 293, 294, 302 McCaldin, J. O., 195-97 McCall, D. W., 398 McCann, J., 207, 209 McCarroll, J. J., 292 McCarty, J. G., 286, 288, 289, 291, 298, 299 McClain, W. M., 427, 428, 430, 431, 434 McClung, F. J., 431 McClung, R. E. D., 176, 450 McCollum, L., 343, 344 McConnell, H. M., 307, 311, 317, 318, 326, 327 McCoy, B. J., 231 McDonald, I. R., 441-43, 445-47 McDonald, J. R., 433 McDowell, J. H., 34, 39 McEliney, G., 288 McElwain, D. L. S., 228, 233 McFee, J. H., 497, 504, 505 McGaughy, T. W., 176 McGee, I. J., 441, 445 McGill, T. C., 195-97 McGurk, J. C., 537-40, 543-46, 548, 551, 553, 555 McIlvaine, P. M., 143 McIntosh, J. R., 519 McKay, R. A., 406, 407 McKee, C. W., 288 McKinnon, A. J., 527 McKnight, R. P., 154

McLachlan, A. D., 167 McLaughlin, A. C., 309, 310, 323, 328, 329 McMaster, L. P., 523 McMillan, W. L., 513 McMorris, I. W. N., 124, 129, 134 McQuarrie, D. A., 446, 519 McTague, J. P., 449, 450, 462, 464, 465 Mead, C. A., 195 Meadows, J. H., 371 Meath, W. J., 452 Medema, J., 134 Meentzen, M., 41 Megaw, H., 499 Megerle, K., 120 Mehl, J., 23 Mehler, E. L., 15 Mehring, M., 397, 401-4 Melchoir, D. L., 157, 158 Mely, B., 311 Memming, R., 190, 196, 199, 201, 202, 209, 211 Mendelsohn, R., 41 Mendelson, R., 318, 320 Menezes, C., 214 Menezes, S., 214, 215 Menger, E. L., 32, 44, 45 Menzel, D., 285, 288, 292, 295, 301 Menzinger, M., 79, 80 Merrifield, R., 475 Merrill, J. R., 120, 129 Merril, R. P., 292, 302 Merrill, S. H., 337 Merz, W. J., 499 Merzbacher, E., 120, 121 Metcalf, J. C., 307-9, 318, 323-29, 331 Metz, F., 427, 428, 430 Meyer, R. B., 497, 513, 514, 516 Mgeladz, G. M., 154 Michael, J. V., 236, 238, 243 Michaels, F. M., 34 Michaelson, D. M., 318, 319, 328 Micheels, R. H., 545-47, 554, 555 Michel, K. W., 72, 85 Mickas, D., 512 Mihama, K., 269 Mihelcic, D., 243 Mikami, N., 430, 431 Miki, N., 34 Miknis, F. P., 170 Milder, S. J., 45, 46 Miles, J. L., 124

Miles, R. B., 434

Miljanich, G. P., 332 Miller, B., 214, 215 Miller, D. R., 295 Miller, J. F., 145 Miller, M., 27 Miller, R. L., 505 Miller, W. D., 151 MILLER, W. G., 519-35; 522-24, 526, 528 Miller, W. H., 65 Millett, F., 36 Millich, F., 530 Mills, B. E., 10 Mills, D. L., 118 Milzanich, G., 158 Mims, C. A., 79 Minogin, V. G., 429 Minoura, H., 214 Minton, A. P., 152 Mintz, D. M., 79 Mishin, V. A., 434 Mishustin, A. I., 174, 175 Mitchell, D. J., 447 Mitchell, D. N., 226 Mitsui, T., 44 Miyake, M., 212 Miyata, N., 528 Miyoshi, Y., 45 Mizuno, H., 340 Mohler, J. M., 46 Molina, M. J., 237 Möllers, F., 196, 199, 201, 209 Mollica, V., 147 Monaselidze, J. R., 154 Monger, T., 49, 50 Moniz, W. B., 403, 405-7 Monk, P. R., 160 Monroe, D. R., 302 Montal, M., 34 Montgomery, J. A. Jr., 450, 465 Monti, M., 161 Moodie, A. F., 255, 257, 262-64, 267, 271, 280 Moore, C. B., 70 Moore, C. E., 363 Moortgat, G. K., 236 Mopsik, F. I., 502-4, 509, 511 Morel, J. P., 145 Moret-Bailly, J., 433 Morgan, H. S., 529 Morgan, P. W., 527, 529, 530 Mori, N., 525, 526 Moriguchi, M., 279 Morimoto, N., 276 Morisaki, H., 209, 211 Morita, N., 537

Morley, C., 237 Morokuma, K., 27 Morris, M. D., 434 Morris, T., 489 Morrison, S. R., 190, 199, 201, 211 Morse, D. L., 191, 203, 209 Morse, P. M., 14 Morsink, J., 488 Mosbach, K., 157 Moscowitz, A., 38 Moseman, M., 124, 126, 127, 129-31, 135, 137 Mott, N. F., 60, 85, 195 Mountcastle, D., 143, 145, 150, 157, 158 Moy, J., 78 Moya, F., 433 Mrevlishvili, G. M., 153, Muckerman, J. T., 230, 231 Mukamel, S., 68 Mulac, W. A., 237 Mulder, J. J. C., 49, 50 Mullen, L. O., 507 Muller, L., 409, 410 Müller, M., 269 Muller, R., 398 Müller, R., 406 Muller, U., 37 Muller-Warmuth, W., 172 Mulliken, R., 363, 364 MULLIKEN, R. S., 1-30; 1, 3-6, 9, 11-26 Munkelwitz, H. R., 237 Munn, R. W., 479 Murakami, S., 209 Murayama, N., 508 Murray, R. J., 275 Murrell, J. N., 234, 235, 241, 242 Murthy, N. S., 526 Musbally, G. M., 147 Musikhin, L. A., 425 Myamlin, V. A., 190, 199, 201 Myers, H. P., 290 Myerson, A. L., 227

N

Nabedryk-Viala, E., 35 Nagakura, S., 47 Nagata, F., 269 Nakachi, K., 51 Nakajima, A., 522 Nakajima, H., 522 Nakanishi, K., 37, 38, 41, 44, 46, 47, 51 Nakatami, K., 211, 212 Nakato, Y., 191, 203, 209, Nakazawa, H., 276 Nambu, K., 67, 68 Narang, H., 452 Narten, A. H., 448, 449, 451, 453, 454, 459, 461-64, 467 Narva, D. L., 51 Nasby, R. D., 196, 203, 209 Nefedov, V. A., 425 Neff, B. L., 409, 410 Neil, K. S., 295, 286 Nelson, A. C., 51 Nelson, D. F., 511 Nelson, D. P., 151 Nelson, J. H., 360 Nelson, R. G., 108-10 Nemes, P. P., 35 Neoh, S. K., 82 Nesbet, R. K., 79 Nestor, J., 434 Nethercot, A. H., 194 Netzel, D. A., 170 Netzer, F. P., 302 Neufeld, P., 445 Neumann, M., 288, 289, 292-95 Neuringer, L. J., 319 Neusser, H. J., 427, 438, Newell, R. D., 160 Newman, K. E., 175 Ng, K.-C., 452 Nibler, J. W., 433 Nichols, N., 145, 146, 149 Nicholson, R. B., 253, 276, 280 Nicol, A. T., 402 Niederberger, W., 42, 43, 309-11, 318, 328, 329 Niekamp, C. W., 151 Niekamp, K., 152 Nienhuis, G., 451, 466 Nieuwenhuys, B. E., 296, Nieuwpoort, W. C., 23 Niki, H., 237 Nikitin, E. E., 65, 232 Ninham, B. W., 447 Nip, W., 228 Nobe, K., 209 Noggle, J. H., 170 Noguchi, J., 527 Noll, L., 147, 150, 151 Nomura, Y., 211 Nonhof, C. J., 487 Nordheim, L. W., 123 Norris, C., 290

Norris, C. L., 544, 547,

555 Norris, S. O., 530 Norton, P. R., 291, 292 Novick, S. E., 445 Nozieres, P., 122 NOZIK, A. J., 189-222; 191, 197, 201-5, 207-10 Nye, J. F., 499-501, 511 Nyeland, C., 72

0

Oakes, J., 179 Oates, D. E., 537 O'Brien, D. F., 34 O' Dell, J., 450 Oesterhelt, D., 31, 32, 36, 41, 42 O'Farrell, H. K., 160 Ofengand, J., 358 Ogasawara, K., 507 Ogren, P. J., 244 Ohashi, K., 207, 209 Ohigashi, H., 512 Ohishi, N., 211 Ohmine, I., 44 Ohmori, M., 522 Ohnishi, T., 191, 203, 209, 211 Ohtani, H., 47 Öjelund, G., 145 Oka, K., 236 Oka, T., 537, 541 O'Keefe, M. A., 257, 259, 277, 280 Oki, T. M., 214 Okita, K., 522 Olander, D. R., 286 Oldfield, E., 307-9, 318, 331 Olf, H. G., 505 Olier, R., 203, 209 Oliver, B. G., 205, 209 Olson, D. S., 553 Ono, A., 252, 260, 269 Ono, N., 507 Onodera, Y., 474, 488 Onsager, L., 466, 502, 519 O-ohata, K., 23 Ookubo, N., 522 Opella, S. J., 409 Oppenheim, I., 73, 85 Oppenheimer, R., 4 Orloff, D., 18, 21 Orloff, H., 18, 21 Orlowski, T. E., 488 Orville-Thomas, W. J., 167 Orwoll, R. D., 526 Osa, T., 211 Osada, Y., 531 Osborne, B., 34, 35

Osborne, D. T., 236, 238, Oseroff, A. R., 37, 48-50 Oshiki, M., 512 Oster, G., 466, 519 Ostiguy, C., 148 Ostroy, S. E., 32, 34, 39 Otokozawa, H., 431 Otsu. H., 253 Ott, R. A., 34 Ottensmeyer, F. P., 269 Ottolenghi, M., 39, 42-45, 47-53 Oudar, J. L., 425, 426 Overend, R., 237 Owen, J. R., 214 Owyoung, A., 431 Ozawa, T., 404

P

Pace, S. A., 67, 79, 81 Pacha, A., 118 Pack, R. T., 71 Packer, K. J., 178, 184 Page, D. I., 448, 458, 461, 463, 464 Paigne, J., 292 Pake, G. E., 319 Palinkas, G., 464 Palmberg, P. W., 286, 288, Palmer, H. B., 227, 236 Palmer, R. L., 295, 302 Palumbo, M., 102 Panar, M., 526, 529, 530 Pang, H. F., 79, 81 Pao, Y.-H., 97, 429 Papahadjapoulos, D., 327 Papkov, S. P., 529, 530 Papp, H., 288, 289 Paraskevopoulus, G., 237 Parington, P., 325 Pariser, R., 19 Park, R. L., 285 Parker, D. H., 431 Parker, J. H., 60, 64, 76 Parker, V. B., 363 Parker, W. W., 269, 270 Parkes, D. A., 244 Parkhurst, H. J., 450 Parmenter, C. S., 430 Parr, R. G., 18, 19 Parry, D. A. D., 526 Parsons, J. R., 277 Parsons, R. W., 537, 539 Pashley, D. W., 253, 276, Pasternack, L., 63, 76, 81, 82, 86

PATEL, D. J., 337-62; 342 Patey, G. N., 447, 452 Pattengill, M., 245 Pattengill, M. D., 71 Patterson, G. D., 466 Pauling, L., 1, 14, 18, 363, 448, 461 Pauncz, R., 25 Payne, W. A., 236, 238, 243, 244 PazAndrade, M. I., 151 Pazoha, T. A., 431 Pealat, M., 433 Pearlstein, R., 479 Pearson, E. F., 96, 97, 100, 544, 547, 555 Pechukas, P., 65, 67, 85 Pecile, C., 118 Pecora, R., 450, 465, 466 Pedley, M., 147 Peeters, J., 236 Peggion, E., 102 Peiser, A. M., 60 Pembleton, R. G., 403, 406, 407 Pendry, J. B., 254 Penman, S., 342 Penn, R. D., 35 Penner, A. P., 233 Pennings, A. J., 143 Penwick, J. P., 337 Perchold, W., 312 Peri, J. B., 126 Perigaud, A., 425 Perigogine, I., 167 Perona, M. J., 244 Perreault, G. J., 53 Perrin, M., 425 Perron, G., 145-48 Perry, D. L., 300 Perry, D. S., 60-64, 75, 79-82 Perry, R. A., 236, 237 Perry, T. T., 426 Pershan, P. S., 403 Person, W. B., 25, 26 Peterlin, A., 505 Peters, A., 324, 325 Peters, D., 24 Peters, K., 47, 49, 50 Petersen, N. O., 313, 315-20, 322, 325, 326, 332 Peterson, R. L., 507 Peticolas, W. L., 318, 320, Pettei, M. J., 41, 42, 53 Pettitt, B. A., 176 Peyerimhoff, S. D., 23, 364 Pezzin, G., 156

Pfeifer, H., 182, 398 Pfeiffer, M., 432, 434 Pfeil, W., 155 Pfister, G., 508 Phelan, R. J., 507 Philip, P. R., 142 Phillips, W. D., 526 Phillips, W. G., 95 Philpott, M., 474 Picker, P., 142, 145 Pickett, H. M., 537, 538, 541, 545 Pieranski, P., 514 Pierce, L., 260, 276 Pignet, T., 289, 294, 295 Pimentel, G. C., 60, 64, 76 Pines, A., 328, 398, 401, 402, 404, 409 Pings, C. J., 462 Pintar, M. M., 182 Piper, T. C., 286 Pirs, J., 313 Piszkiewicz, L. W., 244 Pitkethly, R. C., 292 Pitner, T. P., 179 Pitts, J. N., 236, 237, 244 Pizzini, S., 209 Placzek, G., 435, 463 Plagge, A., 288, 301 Plaistowe, J., 236 Platner, J. W., 269 Pleskov, Y. V., 190, 199, 201 Plotnikov, V. V., 142, 143 Plummer, E. W., 115, 287 Pober, J. S., 35 Podkovyrin, A. I., 175 Podo, F., 307-9, 318, 323, 331 Poehler, T. O., 544, 551, 554 Polak, M., 404 Polanyi, J. C., 60, 61, 63, 65, 71, 72, 75, 79, 82, 83, 85 Polanyi, M., 60 Pollak, E., 63, 70, 75-81 Pollock, E., 37, 38, 44, 47, Polnaszek, C. F., 309, 311, 318, 319, 321-23, 326, 328, 331, 332 Pommerening, K., 180 Pontus, M., 36 Poo, M. M., 36 Poole, P. R., 86 Pope, W. M., 60 Pople, J. A., 19, 21-24, 467 Popov, A. I., 175, 177

Porte, M., 42 Porter, R. N., 60 Porter, R. S., 527 Potenza, J., 172 Potter, J. D., 151 Potzinger, P., 243 Powers, L., 403 Powis, G., 158 Powles, J. G., 448, 463, 464 Pownalls, H. J., 151 Poynter, R. L., 537 Prakash, V., 553 Pratt, G., 237 Pratt, K. C., 176 Pratt, L. R., 447, 448, 457, 459, 461 Prestegard, J. H., 309, 323, 324, 331 Preston, H. J. T., 17 Preston, J., 529 Preston, R. K., 71 Preston, S. S. III, 505 Preuss, A. W., 243 Price, G. L., 272 Prince, M. B., 206, 207 Pritchard, D., 71 Pritchard, H. O., 73, 223, 228, 233, 241 Pritchard, J., 286, 288, 289 Privalov, P., 162 Privalov, P. L., 142, 143, Procaccia, I., 59, 61-63, 65, 66, 68, 70-74, 83, 85 Proch, D., 85 Proctor, A. E., 60 Proffitt, M. H., 537 Prokhorov, A. M., 434 Prophet, H., 363 Propst, F. M., 286 Prosen, E. J., 160 Prost, J., 519 Prota, G., 151 Prueber, E., 158 Pruett, J. G., 60, 64, 79, 80 Prussak, W., 537 Pugel, T. M., 287 Pugmire, R. J., 44 Pulay, P., 385 Pullman, B., 344 Pummer, H., 85 Purcell, J. M., 181 Purvin, V., 37 Pysh, E. S., 96, 97, 100, 102-4, 111, 112

Quack, M., 65, 67, 72, 223,

228, 237, 238, 244, 245 Quadrifoglio, F., 151 Quentrec, B., 450, 456, 465 Quigley, G. J., 340, 346, 348 Quinn, C. P., 244 Quinn, R. K., 196, 203, 209

1

Raber, H., 402, 403 Rabinovitch, B. S., 223, 232-34, 241, 242, 245 Rabitz, H., 60, 68, 537, 539, 540 Racker, E., 152 Rackovsky, S., 476 Radda, G. K., 309, 328, 329 Radom, L., 21, 22 Rafferty, C. W., 43 Raftery, M. A., 36 Rahman, A., 454, 464 Rai, J. H., 522-24, 526, 528 Rainville, M., 277 RajBhandary, U., 337, 339 Ralph, E. K., 349 Ramamurthy, V., 37 Ramirez, J. E., 181 Ramsden, J. M., 184 Ramshaw, J. D., 451, 466 Rao, C. N. R., 170 Rao, S. T., 340 Rasaiah, J. C., 452 Rashba, E. I., 474, 488 Ratajczak, E., 223, 243, 244 Ratajezykowa, I., 115 Ratcliffe, R. G., 349 Ratner, M. A., 67, 68 Rau, P., 301 Raubach, R. A., 35 Rauch, J. E., 435 Raumann, G., 529 Ray, I. L. F., 276 Razumova, T. K., 429 Rebick, C., 74, 78-80, 84, 231 Reck, G. P., 82 Record, T., 184 Redfield, A. G., 344, 349, 350, 401 Redhead, P. A., 286 Redon, M., 537 Reed, P. D., 288, 302 Rees, A. L. G., 14 Reeves, C. M., 3, 18 Reeves, L. W., 168 Regnier, P. R., 433 Rehak, N. N., 160 Reich, P., 432 Reich, R., 39

Reid, B. R., 342-49, 353-Reid, D. S., 147 Reid, E. S., 432 Reif, F., 403, 404 Reimarsson, P., 175 Reinecker, P., 479, 489 Renthal, R., 43 Rentzepis, P. M., 47, 49, 50, 52, 53, 429 Resing, H. A., 178, 182, 183, 398, 403, 405-7 Retallack, L. J., 537 Retcofsky, H. L., 403 Revel, J. P., 35 Reynolds, J. A., 146 Rhim, W.-K., 398, 402, 410, 411, 414, 415 Rhinehardt, K. B., 158 Rhodes, D., 346 Rhodin, T. N., 288, 292 Rialdi, G., 141, 143, 145, 150 Ribeiro, N. S., 343, 344 Rice, M. J., 118 Rice, S. A., 167 Rich, A., 337, 339-41, 346, 348 Richards, P. I., 538 Richards, R. E., 309, 310, 328, 329 Richards, W. G., 382 Rieke, C. A., 18, 19-22 Riesner, D., 345, 354, 356 Rigby, M., 447 Rigny, P., 308, 309, 314 Rill, R., 100 Rimai, L., 37, 45 Rimpel, G., 236 Rinehart, E. A., 554 Ripa, T., 161 Ritchie, G. A., 309, 328, 329 Ritz, G. P., 434 Riwan, R., 292 Robbins, M., 214, 215 Roberts, G. C. K., 325 Roberts, J. A., 537, 539, 554 Roberts, M. W., 288, 292, 299 Roberts, R. E., 226, 230, 231 Roberts, R. T., 327 Robillard, G. T., 343-46, 348, 349, 353-57 Robin, M. B., 97 Robinson, C., 523, 525, 526,

Robinson, G. W., 473

Robinson, P. J., 223 Rochlin, G., 123, 124 Rode, B. M., 171 Roeder, S. B. W., 314-16, Rogers, L. B., 434 Roh, W. B., 434 Rohart, F., 544 Rohlich, P., 35 Rohwer, P., 63, 79 Romer, R., 346, 354, 356 Römer, R., 344 Romer, R. H., 537, 544, 545 Römheld, M., 537 Ron, A., 431 Ronis, D., 447 Roos, B. O., 391 Roothaan, C. C. J., 3, 8 Rordorf, B. F., 345 Rosch, N., 68 Rose, H., 260 Rose, S. D., 269 Rosen, B., 363 Rosenfeld, T., 39, 42-45, 47-53 Ross, K. D., 157 Ross, P. D., 143, 151, 152 Rost, K. A., 63, 74 Roth, P., 238 Rothe, E. W., 82 Rothman, J. E., 326 Rovida, G., 303 Rowan, R. III, 38, 44, 179 Rowland, F. S., 237 Rubber, D. J., 402, 404 Ruben, D. J., 402, 404 Ruben, Y., 177 Rubin, J., 360 Rubinson, M., 63, 70, 72, Rudolph, H. D., 537 Rudolph, S. A., 159 Rueben, J., 177 Ruedenberg, K., 15, 16, 24, Rulis, A. M., 60, 64, 74 Russell, K. E., 227 Russo, S., 529 Ruta, M., 403 Rutar, V., 180, 403, 404 Ryan, L. M., 402, 406 Rybaczewski, E. F., 409 Rydberg, R., 14 Rye, R. R., 286, 289, 293, 294, 296

S

Saba, R. G., 527 Sabin, J. R., 67

Sabol, J. S., 37, 46 Sackman, E., 327 Safron, S. A., 65, 76 Sahni, R. C., 18 Saibil, H., 35, 36 Saint-James, D., 122 Sakamoto, H., 191, 207, 209 Sakata, T., 191 Salaris, F., 529 Salem, L., 21, 46, 51, 52 Salemink, P. J. M., 345 Salmon, L. S., 24, 25 Salomon, R. E., 502 Salour, M. M., 428 Salsbury, N. J., 307-9, 318, 328, 331 Saludjian, P., 526 Salzano, F. J., 190 Samulski, E. T., 182, 525-28 Sanchez, A., 555 Sanchez, R. L., 209 Sanchez-Sinecio, F., 214 Sanctuary, B. C., 67, 71, 73 Sandeman, R. J., 239 Sanders, J. V., 255, 262 Sanderson, R. T., 194 Sandler, S. I., 445, 448, 449, 452, 456, 462, 467 Sandstrom, D. R., 287, 297 Santee, G. L., 522-26, 528 Santry, D. P., 19 Sardet, C., 35 Sasaki, S., 527, 528 Sass, S. L., 273 Sathyamurthy, N., 71, 72 Satterthwaite, C. B., 402 Sauer, J. A., 527 Saunders, J. K., 172 Saupe, A., 526 Savage, C. M., 435 Savage, J. J., 145, 147 Savel'ev, A. D., 434 Scalapino, D. J., 117, 119-24, 132 Scandola, M., 156 Sceats, M., 489 Schaefer, H. F. III, 3, 18, 22, 371, 391-94 Schaefer, J., 403, 405-7 Schaefgen, J. R., 529, 530 Schaffer, A. M., 44, 46, 47 Schatz, G. C., 67, 68, 75, 79, 82 Scheibner, E. J., 285 Scheler, G., 406 Schenkman, J. B., 158 Scherr, C. W., 17 Scherzer, O., 258

Schiemann, V. H., 450 Schillinger, W. E., 179 Schimmel, P. R., 346 Schindler, H., 312-14, 317 Schippert, C., 236, 243, 244 Schippert, E., 177 Schirmer, J., 10 Schirmer, R. E., 170 Schlag, E. W., 427, 428, 430 Schleich, D. M., 209 Schleyer, P. von R., 21-23 Schmailzel, U., 85 Schmalz, T. G., 537-40, 542-45, 547, 551, 553, 555, 556 Schmatjko, K. H., 75 Schmid, W. J., 436 Schmidberger, R., 487, 489 Schmidt, J., 487, 490 Schmidt, L. D., 285, 288, 289, 291, 293, 294, 295, 302 Schmidt, P. G., 344, 351-53 Schmiedekamp, A., 385 Schnabel, B., 406 Schnatterly, S. E., 96 Schnepp, O., 96-100 Schober, O., 286, 288, 289, 292-95 Schott, M., 493 Schottky, W., 195 Schöttler, J., 231 Schouteten, C. J H., 143 Schrag, J. L., 522 Schramm, C., 177 Schreiber, E., 332 Schreiber, J. L., 60, 64, 65, 71, 72, 79, 82 Schreiber, L. B., 398, 403, 410, 411, 414, 415 Schreiber, P. W., 434 Schrepp, W., 537 Schrieffer, J. R., 118, 292 Schrier, A. H., 346 Schriver, J., 182, 183 Schrötter, H. W., 436 Schubert, V., 243 Schuhmann, L., 41 Schulten, K., 43, 44, 51, 53 Schultz, A., 63, 82 Schultz, J. M., 512 Schumm, R. H., 363 Schwandt, G., 190, 199 Schwanebeck, W., 243 Schwartz, A. T., 158 Schwartz, B., 214, 215 Schwartz, R. N., 176 Schwartz, S., 35 Schwarz, J. A., 126, 136,

Schwarz, S. E., 431 Schwarzer, E., 474 SCHWENDEMAN, R. H., 537-58; 537, 538, 543, 545, 548, 553-55 Schwerzel, R. E., 205 Schwinger, J., 538 Sculley, M. J., 447 Sears, B., 319, 323, 331 Sears, R. E. J., 402 Sears, V. F., 450, 464 Seelig, A., 309, 311-13, 317 Seelig, J., 309-14, 317, 318, 328-30, 403 Seely, P. J., 309, 328, 329 Sefcik, M. D., 403 Segal, G. A., 19 Segard, B., 547 Seibold, M. L., 143 Seiter, C. H. A., 309, 314-20, 325, 330, 331 Selinger, J., 403, 404 Senthilnathan, V. P., 170 Sessler, G. M., 498 Setser, D. W., 60, 63, 72, 74-76, 81, 82, 85 Sexton, B., 115, 136, 286 Shaltyko, L. G., 525 Shapiro, M., 67 Sharko, P. T., 450 Sharman, E., 97, 100 Shattuck, T. W., 402, 404 Shaub, W. M., 433 Shavitt, I., 3, 18, 391 Shaw, D., 167 Shay, J. L., 214, 216 Sheetz, M. P., 309, 310, 318-20, 322, 328 Shekhtman, V. S., 425 Shelby, R. M., 493 Shen, Y. R., 422, 425 Sheng, S. J., 431 Sherfinski, J. S., 409 Sherman, A., 3, 8, 18 Shiao, D. D. F., 149 Shichi, H., 39 Shichida, Y., 47 Shigeishi, R. A., 288 Shigemune, T., 537 Shigorin, V. D., 425 Shimizu, T., 537, 538, 541, 545, 547, 548, 553 Shimoda, K., 538, 541, 555 Shimoni, Y., 67, 72, 73, 75, 76, 85 Shipley, G. G., 157, 319 Shipulo, G. P., 425 Shirane, G., 499 Shirley, D. A., 10, 286

Shishaev, A. V., 429, 430

Shoemaker, R. L., 452, 537 Shortridge, R. G., 63, 74 Shporer, M., 179, 180 Shriver, J., 47 Shui, V. H., 231-33 Shuler, K. E., 73, 85 Shulman, R. G., 342, 344, 345, 351, 356, 357 Shuman, H., 254 Sicree, A. J., 530 Siebrand, W., 479 Siegbahn, P. M., 391 Siegbahn, K., 11 Sigler, P. T., 342 Silbert, D. F., 158 Silbey, R., 473, 475, 476, 478, 479 Silcox, J., 262 Silver, J. A., 63, 79 Silverstein, S. D., 121 Simmons, J. G., 123 Simon, H. E., 177 Simon, J., 154 Simonaitis, R., 237 Simons, J., 227 Simonsen, M. G., 124, 129, 134, 135 Sinclair, R. G., 530 Singer, L., 431 Singh, S., 170 Singh, Y., 445 Singh-Boparai, S. P., 289, 294 Singleton, D. L., 236, 244 Sinning, G., 401 Sjoholm, I., 152 Skaarup, S., 385 Skarlatos, Y., 129 Skarnulis, A. J., 273, 280 Skerjanc, J., 151 Skinner, H. A., 151 Sklar, A. L., 19 Sköld, R., 145, 149 Skrlac, W. J., 63, 82, 83 Slak, J., 404 Slater, J. C., 9, 15, 18, 20, 363 Slaughter, S. E., 35 Sleight, A. W., 197, 209 Slichter, C. P., 167, 397-401, 403, 541 Slifkin, M. A., 42 Sloan, J. J., 60 Small, D. M., 157, 319 Smidt, J., 172 Smirnov, V. V., 434 Smith, D. J., 63, 75, 79 Smith, G. P., 63, 237 Smith, H. G., 34, 35 Smith, I. C. P., 351

Smith, I. W. M., 60, 72, 77, 86, 237, 238, 244 Smith, J. L., 358 Smith, J. N., 295, 302 Smith, L., 143 Smith, N., 71 Smith, P. H., 124 Smolej, V., 404 Snaith, J. W., 153 Snider, R. F., 542 Snyder, H. S., 538 Snyder, J. A., 519 Snyder, P. A., 98, 100 So, S. P., 382 Sobajima, S., 526 Soifer, D., 519 Sokhadze, V., 153, 154 Sokoloski, E. J., 332 Sokolova, T. S., 529, 530 Soll, D. G., 360 Somers, R. M., 544, 551, 554 Somorjai, G. A., 286, 294, 296, 298, 303 Somsen, G., 146, 147 Sondergaar, A., 72 Sondergeld, M., 428 Song, J. J., 435 Soos, Z., 473 Sorenson, W. R., 529 Soules, T., 476 Soulignac, J. C., 237 Southgate, P. D., 426 Soven, P., 486 Spach, G., 96, 97, 101-3, 522, 526 Speiser, S., 428 Spence, J. C. H., 277 Spencer, J. E., 237 Sperling, W., 43, 44 Spicer, L. D., 223 Spicer, W. E. Jr., 290, 291, 302 Spiess, H. W., 401, 402 Spink, C. H., 142, 145, 147, 149, 152, 160 Spiro, T. G., 434 Spitler, M. T., 211 Spomer, H., 14 Spoonhower, J. P., 41, 42, 45, 53 Sprecher, C. A., 102-4, 106-Springer, C. S., 322 Sprinzl, M., 351 Spruiell, J. E., 529 Squire, I. M., 526 Sridhar, C. G., 526, 527 Srinivasan, S., 153 Srivastava, G. P., 537

Stace, A. J., 234, 235, 241, Stacey, L. M., 398 Stachelek, T. M., 431 Staemmler, V., 385 Stafford, R. G., 428 Stahmann, M. A., 521, 523 Stankowski, J., 537 Stanton, G. W., 452, 462 Stanton, L., 435 Staples, B. R., 160 Stark, R. E., 177, 404, 409 Starobogatov, I. O., 429 Steele, W. A., 176, 450, 456 Steenhoek, L. E., 430 Stefanou, H., 528 Steim, J. M., 157, 158, 314, 329 Stein, A., 346 Stein, S. E., 241 Steiner, D. C., 239 Steinfeld, J. I., 60, 63, 68, 70, 72, 73, 81, 85, 86, 424, 538, 542, 545-48, 553-55 Steinmetz, D. L., 95 Stejskal, E. O., 327, 403, 405-7 Stell, G., 451, 452, 465-67 Stengle, T. R., 175 Stephens, R. S., 174 Sternberg, B., 158 Stettler, J. D., 67 Stevens, E. S., 102, 104 Stewart, G. W., 79 Stewart, R. F., 23 Stickel, D. C., 151, 159 Stickney, R. E., 295 Stief, L. J., 243, 244 Stille, J. K., 530 Stillinger, F. H., 446, 454, 464 Stockburger, M., 430 Stockton, G. W., 309, 311, 318, 319, 321-23, 326, 328, 331, 332 Stoeckenius, W., 31, 32, 36, 37, 41-43, 45, 53 Stoessler, P. R., 147 Stoffel, W., 332 Stoicheff, B. P., 431 Stokes, H. T., 398 Stolen, R. H., 434 Stoll, M. E., 331, 398, 404, 409, 410, 413-15 Stolte, S., 60 Stone, W. L., 32, 34 Stout, C. D., 340 Stout, J. W., 153

Straley, J. P., 527

Strange, J. H., 398 Strassler, S., 118 Straus, J., 127 Streett, W. B., 441, 445, 448, 451, 452, 456, 461 Streit, K. M., 288 Streitwieser, A., 19 Strobl, G., 476, 479 Strobl, T., 488 Strong, R. L., 227 Stryer, L., 35, 37, 38, 46, 49 Strzelecki, L., 497, 513, 514 Stuart, J. D., 434 Stubbs, G. W., 35, 36 Studebaker, J., 179 Stuhl, F., 237 Stull, D. R., 363 Sturtevant, J. M., 141, 148, 149, 151, 153-54, 158, 159, Subramanian, S., 151 Suchard, S. N., 85, 363 Suda, Y., 191 Suddath, F. L., 340 Suess, G. N., 243 Sugai, S., 527 Suito, E., 279 Sulkes, M., 39 Sullivan, M. J., 44 Sullivan, T., 546, 555 Sumi, H., 474, 489 Suna, A., 474, 493 Sundaralingam, M., 338, 340, 344, 360 Sunder, S., 318, 320 Sundstrom, V., 47, 49 Sung, H. N., 428, 430, 431, 447 Sung, J. P., 63, 75, 76, 81, 82 Surratt, G. T., 391 Sussman, J. L., 340, 346 Sussner, H., 512 Sutcliffe, L. H., 167 Sutherland, J. W. H., 152 Sutin, N., 211 Sutton, D. G., 85 Suurkuusk, J., 143, 145, 149, 153, 154, 158 Suwelack, D., 403 Suzuki, H., 45, 46, 51 Suzuki, K., 464 Swanson, L. W., 115 Swift, T. J., 490 Switendick, A. E., 475 SWOFFORD, R. L., 421-40; 428 Sykes, B. D., 38, 43, 44

Sze, S. M., 193, 194 Szeverenyi, N. M., 177 Szöke, A., 430 Szuts, E. Z., 34

T

Tabony, J., 173 Tabor, M., 85 Tadokoro, H., 504 Takahashi, A., 174 Takahashi, T., 527 Takahashi, Y., 504 Takami, M., 555 Takashita, S., 527 Takayanagi, K., 271 Takeguchi, C. A., 157 Taketa, H., 23 Talkowski, C., 332 Tall, A. R., 157 Tamagake, K., 63, 74 Tamir, M., 63, 65, 76, 79, 80, 82 Tamm, P. W., 285, 289, 294, 295 Tamura, H., 191, 207, 209, Tamura, M., 507 Tanaka, J., 191 Tanaka, K., 539, 541, 542, 544, 545, 548, 549, 553 Tanaka, N., 269 Tanford, C., 146, 447 Tang, I. N., 237 Tang, S. Y., 82 Tanji, T., 252 Tanner, J. E., 327 Tao, T., 360 Tapping, R. L., 291, 292 Taran, J. P.-E., 433 Tardieu, A., 35 Tardy, D. C., 232, 233, 239, 242 Tarr, C. E., 182, 346, 348, 349, 353-56 Tate, N., 267 Tatsuoki, O., 196, 197, 209 Tatsushi, O., 211 Tavan, P., 43, 53 Taylor, D. R., 133, 134 Taylor, P. C., 397, 403, 404 Taylor, T. N., 288 Teeter, M. M., 346, 348 Tetenfeldt, J., 404 Teitelbaum, H., 228, 230, 236 Teller, E., 6 Teramoto, A., 522 Terao, T., 402, 404

Terhune, R. W., 432, 433, Terner, J., 41, 53 Thibault, J., 537, 546 Thiebe, R., 354, 356 Thiel, W., 20 Thomas, C. L., 124 Thomas, D., 474 Thomas, D. D., 34 Thomas, J. M., 124 Thomas, M., 514 Thomas, R. G. O., 63, 74, 79 Thomas, S. J., 124 Thomas, W. J., 124 Thompson, D. L., 230 Thompson, M. G. R., 260 Thompson, T. E., 158 Thompson, W. A., 117 Thomson, J., 214, 215 Thran, D., 236 Thrash, R. J., 431 Thrush, B. A., 63, 74, 79 Thurmond, C. D., 204 Tiddy, G. J. T., 181, 307, 308, 318, 331 Tiffany, M. L., 105 Tiffen, R. S., 407 Tiktopulo, E. L., 155, 157 Tildesley, D. J., 452, 456, 461 Tilsley, G. M., 237 Tinoco, I., 154 Tinoco, I. Jr., 101-3 Tipping, E., 151 Tobolsky, A. V., 525, 526, Toennies, J. P., 60, 64, 74, 86, 231 Tohyama, K., 523, 526, 528 Tokito, Y., 45 Tokunaga, F., 41 Tolle, H. J., 199, 201, 209 Tolles, W. M., 433, 435 Tomita, K., 490 Tomkiewicz, M., 196, 202, 203, 209, 211 Tomkiewicz, Y., 493 Toniolo, C., 102, 103 Tonomura, S., 209, 211 Top, Z. H., 75, 76, 81 Torchia, D., 47 Torchia, D. A., 403 Torman, J. V. D., 402 Tormmel, J., 172 Torrey, H. C., 538, 542 Torruella, A. J., 456 Toyozawa, Y., 474, 488 Tracy, J. C., 286-88, 291, 292 Trainor, D. W., 226, 227,

230, 231, 236, 238 Träuble, H., 312, 327 Traverna, R. D., 158 Tredwell, C. J., 432 Tregay, G. W., 231 Tribus, M., 64, 65 Tributsch, H., 199, 201, 211, 214, 216 Trickey, S. B., 67 Triebel, W., 431 Trissl, H. W., 34 Tritton, T. R., 158 TROE, J., 223-50; 65, 72 Troitsky, G. V., 155 Trotman-Dickenson, A. F., Truhlar, D. G., 66, 72, 78, 79 Truscott, T. G., 49 Tsai, F., 545 Tschoegl, N. W., 522 T'so, P. O. P., 344, 351, 354 Tsubomura, H., 191, 203, 209, 211, 212 Tsuiki, M., 214 Tsujita, Y., 527 Tsutsumi, A., 527 Tuherm, T., 406 Tullock, A. P., 309, 311, 318, 319, 321-23, 326, 328, 331, 332 Tully, J. C., 63, 65, 76 Tunggal, B. D., 332 Turner, D. R., 190, 199 Turner, R. D., 433 Tutsch, R., 171 Twarowski, A. J., 428, 430, 431 Tyrrell, H., 160

Ueda, Y., 537, 541 Uematsu, I., 525-27 Ukleja, P., 313 Ulmius, J., 308, 309, 314, 318, 319, 332 Umstead, M. E., 86 Unland, M. L., 537, 546 Unwin, P. N. T., 36 Uosaki, K., 205, 209, 210, 212 Upchurch, E. T., 71 Urbina, J., 309, 310, 331 Utlaut, M., 269, 270 Uyeda, N., 279

Vaerends, E. J., 287

Valance, W. G., 231 Valdes, R. Jr., 153 Valenti, B., 529 Valic, M. I., 314-16, 318-20 Valiev, K. A., 173 Valleau, J. P., 447 Vallouy, C., 203, 209 Van Bokhoven, J. J. G. M., 134 van Breugel, P. G. J., 49, 50 Vandenberg, C. A., 35 Van den Bergh, H., 228, 230, 236, 238, 241, 243, 244 Vanden Berghe, R. A. L., 199, 201 VanderHart, D. L., 402, 403, 409, 410 van der Meer, K., 49, 50 Van der Velde, G. A., 23 Van der Waals, J. H., 487 Van Deusen, R. L., 530 Van Hecke, P., 402 Van Holde, K. E., 100 van Hook, A., 143 Van Meirhaeghe, R. L., 195, 196, 209 Vannice, M. A., 298 Van't Hof, C. A., 490 van Thuijl, J., 49, 50 Van Vleck, J. H., 3, 8, 14, Van Willingen, H., 404, 409 Varadi, V., 344 Vasilenko, L. S., 429, 430 VAUGHAN, R. W., 397-419; 184, 331, 397, 398, 402, 409-11, 413-15 Veeman, W. S., 402 Vega, A. J., 331, 398, 404, 409, 410, 413-15 Vega, S., 402, 404 Veksli, S. J., 328 Velich, A., 151 Velick, S. F., 151 Veltman, I., 82, 83, 237 Venables, J. A., 255, 272 Venkatchar, A. C., 537 Venkstern, T. V., 156 Vennik, J., 195 Venzl, G., 67 Verlet, L., 445-47, 449 Verma, A. L., 41 Vernon, F. L. Jr., 538, 539 Versmold, H., 168 Vieth, H.-M., 402 Viinikker, E.-K., 10

Vijh, A. K., 190, 199, 201 Vila, C. L., 65, 82

Vilhjalmsson, R., 172 Vincent, J. M., 526 Vipond, P. M., 100 Virmaux, N., 34 Visseren, W. J., 124 Viswanath, Y., 288 Vlach, V., 151 Vogrin, F. J., 177 Vold, R. L., 526 Vold, R. R., 177 Volkov, T. I., 525 Volokhina, A. V., 529, 530 Voltaggio, V., 523 von der Haar, F., 156 Von Lewis, M., 158 von Niessen, W., 10, 23 von Rosenberg, C. W., 236, 238 Von Schutz, J. U., 493 Vorburger, T. V., 287, 297 Vosman, F., 346, 348, 349, 353-56 Vuk-Pavlovic, S., 180 Vychera, E., 175

Waage, E. V., 245 Wachs, I. E., 286, 296, 302 Waclawski, B. J., 287, 297 Wada, Y., 497, 501, 502, 505, 522 Waddell, W. H., 44, 45, 51 Wade, C. G., 178, 327 Wadso, I., 142, 145-47, 149, 160-62 Waggoner, A. S., 37, 307, 311 Wagman, D. D., 363 Wagner, A. F., 231 Wagner, H. G., 223, 228, 232, 238, 239, 243, 244 Wagner, P. E., 544, 551, 554 Wagner, S., 214, 216 Wahl, A. C., 12 Wainwright, T. E., 443, 449, Wakeham, W. A., 176 Wald, G., 31, 39, 47, 49, 52 Waldrop, A. A., 269 Waleh, A., 46 Walford, G., 458, 461, 464 Walkauskas, L. P., 226, 228, Walker, R. W., 223, 23€, 244 Wall, J., 253, 261, 262, 269 Wallan, D. J., 434 Wallenstein, R., 427, 428,

430 Walmsley, C., 475 Walmsley, D. G., 124, 129, Walsh, A. D., 23, 364 Walther, H., 538 Wang, C. H., 450 Wang, F. W., 245 Wang, H. Y., 239 Wang, J. H.-S., 537, 538, 542, 545, 547, 548, 553, 554 Warble, C. E., 255, 262-64, 267, 271 Ward, J. C., 523, 525, 526 Warnatz, J., 243 Warrant, R. W., 346, 360 Warren, T. C., 522 Warshel, A., 32, 37, 38, 43-45, 48-52 Washida, N., 227 Wassam, W. A., 63, 67, 75, 83 Wasylishen, R. E., 176 Watanabe, D., 275 Watanabe, E., 276 Watanabe, H., 279 Watanabe, J., 527, 528 Watanabe, M., 279 Watanabe, T., 196, 197, 203, 209, 211, 214, 527 Watson, R. T., 236 Watt, G. D., 159 Watts, R. O., 441, 445 Waugh, J. S., 167, 309, 310, 328, 331, 402, 406, 407 Wayne, R. P., 237 Weatherly, T. L., 545 Webb, G., 124 Webb, G. A., 167, 169 Webb, P. K., 345 Weber, K. W., 143, 152 Webster, D., 178 Wee, E. L., 522-24, 526-28 Weeks, G., 314, 315, 318-20 Weeks, J. D., 442, 443, 445, 446, 449, 460, 467 Wehrli, F. W., 175 Weigmann, H. J., 432 Weimann, G. M., 44 WEINBERG, W. H., 115-39; 118, 124, 126, 127, 129-31, 133, 135, 137, 288, 292, 293, 301, 302 Weiner, D., 431 Weingartner, H., 171, 175 Weinstein, D. H., 191, 209 Weinstein, N D., 65, 76

Weir, C. E., 510 Weis, J. J., 445-47, 452, 464 Weisberg, D., 209 Weiss, G. H., 73, 85 Weiss, K., 44, 45 Weiss, M., 289 Welch, G. J., 505 Weller, M., 34 Wells, B. D., 106, 107 Wells, M. G., 286, 289, 292, 293 Weltzien, H. U., 158 Wemmer, D. W., 402, 404 Wenaas, E. P., 295 Wennerström, H., 175, 179, 307-9, 314, 315, 318, 319, 327, 331, 332 Wensink, W., 537, 539 Werbowyj, R. S., 530 Werncke, W., 431, 432, 434 Wertheim, M. S., 451, 466, 467 Wessel, J. E., 428-30 West, J. E., 498 Westenberg, A. A., 223, 239, 240 Westheimer, F. H., 159 Westra, S. W. T., 182, 183 Whelan, M. J., 253, 276, 280 Wheland, G. W., 19, 21 Whipple, E. B., 403 Whitaker, M. A. B., 401 White, J. L., 529 White, J. M., 67 Whiting, R. F., 269 Whitlock, P. A., 230, 231 Whittenberger, B. P., 37 Whittenburg, S. L., 450 Whytock, D. A., 236, 238, 243 Widman, R. P., 227, 228 Wiener, N., 64 Wiersma, D., 488 Wieting, R. D., 492 Wiggins, J. W., 269 Wigner, E., 5, 15 Wilber, D. J., 176 Wilcomb, B. E., 63, 71, 79, 80 Wilhelmi, B., 431 Wilkins, R. L., 86 Wilkinson, A. E., 151 Wilkinson, G., 25, 27 Williams, E., 332 Williams, F., 204, 205 Williams, J. E., 22 Williams, J. R., 537 Williams, Q., 545

Williams, R., 190, 199, 214 Williams, R. M., 329 Williams, T. P., 39 Willig, F., 196, 211 Wilsch, R., 398 Wilson, A. D., 72, 76, 79, 80 Wilson, L. E., 73, 86 Wilson, R. C., 402, 403, 406, Wilson, R. H., 209, 211, 212 Windsor, P. A., 519, 527 Winn, J. S., 445 Winsche, W. E., 190 Wintermeyer, W., 354, 356 Wirick, M., 95 Wirsam, B., 379 Wishnia, A., 322 Witmer, E. E., 5, 15 Witriol, N. M., 67 Wizinger, R. C., 26 Woessner, D. E , 184, 398 Wohlgemuth, R., 329, 330 Wokaun, A., 409 Wolczanski, P. T., 191, 203, 209 Wold, A., 209 Woledge, R. C., 151 Wolf, A. P., 243 Wolf, D., 398 Wolf, G., 100 Wolf, H. C., 475, 485, 487, 489, 493 Wolf, M., 206, 207 Wolfe, J. F., 530 Wolfe, M., 450 Wolff, E. K., 402, 404 Wolfram, T., 115 Wolfrum, J., 60, 63, 75, 79, 223, 239, 244 Wong, C. P., 530 Wong, K. L., 344, 345 Wong, W., 236 Wong, W. A., 245 Wong, W. H., 227, 228, 231, 232, 234, 235 Wood, R. H., 145, 147 Wood, V. E., 205 Wood, W. P., 237 Wood, W. W., 443 Woodall, J. M., 203, 209, 211

Woodall, K. B., 72, 85

Woodhouse, D. R., 183

Woodbury, E. J., 431

Woodward, A. E., 527 Woody, R. W., 103 Woolf, L. A., 176, 451 Woon-Fat, A. R., 227 Worcester, D., 35, 36 Worcester, D. L., 329 Worley, S. D., 300 Worlock, J. M., 428 Wrasidlo, W., 530 Wrighton, M. S., 191, 196, 201, 202, 203, 205, 209, 214-16 Wu, C. C., 522-24, 526, 528 Wu, C. W., 35 Wu, E.-S., 327 Wu, K. C., 452 Wu, W., 53 Wunsch, L., 427, 428, 430 Wuthrich, K., 342 Wyatt, R. E., 79 Wyman, J., 150, 151

Y

Yaeger, M. J., 35 Yagi, K., 271 Yajima, T., 434, 541 Yamada, C., 537 Yamane, T., 39, 342, 345 Yamaoka, T., 47 Yamashita, T., 522 Yamashita, Y., 527 Yanaka, T., 279 Yang, J. T., 96, 101, 106, 107, 111 Yannoni, C. S., 402 Yao-Chung Ting, 156 Yates, J. T. Jr., 115, 286, 288, 289, 295, 297, 298, 300 Yathindra, N., 340 Yau, A. W., 73, 241 Yazawa, K., 209, 211 Yeagle, P. L., 331 Yefimova, S. G., 529, 530 Yeh, L. S., 209 Yelon, A., 129 Yeung, E. S., 430, 432, 434 Yokozeki, A., 79, 80 Yoneyama, H., 191, 207, 209, 212 Yoshikami, S., 32-34 Yoshikawa, M., 527

Yoshizawa, T., 37, 38, 47-49, 52 Yotsumoto, H., 260, 269, 271 Young, D., 160 Young, M. A., 102-4 Youngren, G. K., 451 Yu, K. Y., 290 Yu, L. J., 514 Yudd, A., 37, 38, 41, 42, 44, 47, 51, 53

Z

Zabel, F., 239 Zaccara, A., 151 Zachau, H. G., 354, 356 Zahniser, M. S., 237 Zamir, A., 337 Zare, R. N., 60, 63, 64, 74, 81, 82 Zavyalov, V. P., 155 Zechmeister, L., 44 Zeidler, M. D., 170, 174, 176, 463 Zeitler, E., 260 Zeks, B., 499 Zellner, R., 236-38, 243 · Zener, C., 60, 85 Zettlemoyer, A. C., 288 Zetzsch, C., 236 Zewail, 424, 476, 485, 486, 488, 493 Zhdan, P. A., 292, 301 Zibret, S., 151 Zierenberg, O., 332 Zimm, B. H., 522 Zimmerman, J. R., 182 Zimmermann, H., 401 Zink, J. I., 177 Zinsli, P., 431 Zipp, A., 39, 183 Zipp, Z., 183 Zolin, V. F., 425, 426 Zubin, J., 269 Zumbulyadis, N., 34 Zunino, F., 151 Zupanćić, I., 180, 403 Zvijac, D. J., 68 Zwanzig, R., 449, 451, ZWEMER, D. A., 473-95;

# SUBJECT INDEX

A Ab initio calculations chemical bonding and, 363-Acetonitrile structure of molecule of, 457, 463, 466 Acetylene CARS studies of, 434 Alcohols oxidation on metal surfaces, 302, 303 Alizarin dyes photoelectrochemical cell sensitization by, 211 Aluminum crystals split interstitials in, 278 Aluminum hydrides chemical bonding in, 375-78 Aluminum oxides catalytic activity of, 124 surface chemistry of, 124 Amino acids CD spectra of, 102, 103 Amino acids, alkyl CD spectra of, 100, 101 Ammonia decomposition on platinum, 296 inversion doublets of, 541 Ammonium chloride structure of, 26 Amphidonors and amphiceptors complex compound structures and, 26 Analine color changes of, 26 Anthracene exciton coherence length in, 489

Antibody-hapten interactions binding affinities for, 149, 150 Argon structure of, liquid form and, 447, 449, 454 Atom and radical recombination reactions, 223-46 atom recombination at high pressures, 233-35 contribution of energy 582

transfer and intermediatecomplex mechanism, 235 density dependency of iodine recombination, 234 diffusion-limited dissociation-recombination reactions, 235 "diffusion limited" reactions, 233 experimental results, 233, 234 high-density recombination rate constants, 234 theoretical studies, 234, 235 atom recombination at low pressures, 226-33 bromine recombination, 227 chlorine recombination. 227, 228 collisional transition probabilities, 231 collision-induced dissociation, 231 C + N recombination, 227 deuterium atoms recombination, 226 electronically excited molecular states, 233 equilibrium rate constants, 230 experimental results, 226-30 flash photolysis, 227 fluorine atoms combination, 227 hydrogen atoms recombination, 226, 228, 229 inefficient colliders. integrated dissociation cross-sections of Br2, 232 iodine recombination, 227-30 low-temperature studies, 226, 227, 230 modified phase space theory of Keck, 231 nonequilibrium effects. 231 nonequilibrium populations

of excited molecules. nonequilibrium redissociation of excited molecules, nonequilibrium solutions of master equations, 233 pseudo second-order rate constants for, 226 rate constant temperature dependence, 227 rotational and vibrational energy coupling, 231 theoretical studies, 230-33 thermal collisional release, 230 three-body collision phenomena, 231 dissociation-recombination reactions relations, 225, 226 master equation for, 225 nonequilibrium populations of excited species, 225 nonequilibrium rate constants, 225 recombination in polyatomic systems at intermediate and high pressures, 242-"activated complexes" localization, 245 centrifugal barriers to rotating molecules, 245 experimental results, 242-45 experimental weak collision recombination rate constants, 243 "hindered rotors," 245 larger systems than five. 243-45 recombination fall-off curves, 244 "statistical adiabatic channel model, " 243 systems with three to five atoms, 243 theoretical studies, 245, 246 recombination in polyatomic systems at low pressures,

236-42

collision efficiency, 240 equilibrium rate constants, 241 exponential collision model, 241 five-atomic systems for spin-allowed reactions, 237

four atomic systems for spin-allowed reactions, 236, 237 low-pressure recombina-

tion rate constants for polyatomics, 238 low-pressure recombina-

low-pressure recombination rate constants for spin-forbidden reactions, 240

nonequilibrium populations and, 239, 240 spin-allowed reactions

spin-allowed reactions experimental results, 236, 237

spin-forbidden reactions experimental results, 237-46

theoretical studies of polyatomics, 239-42

trajectory calculations, 241, 242

triatomic systems for spinallowed reactions, 236

B

Bacteriorhodopsin chromophore binding in, 41

photochemical cycle of, 40-43 prospects for study of, 52,

53 structure and function of, 31, 36, 37, 41-43

Barium diethylphosphate <sup>31</sup>P spectrum of, 406, 408 Bathorhodopsin

primary photoproduct of rhodopsin, 47-50 Benzene

chemical bonding in, 18 NLS studies of, 430, 435, 436

spectrum of, 26 structure analysis of, 412, 413

structure of liquid of, 447, 451

Benzene chromophores CD spectroscopy and, 99 Benzenium ion chemical bonds in, 22, 23 Benzoic acid stretching vibrational mode of, 132

Biological mechanisms biological membranes, 308, 332

Biological membranes phase transitions in, 157-59

Biological systems biological polymers and, 153, 154 dichroism of, 100-12

microcalorimetry of, 144-62 piezoelectric applications

to, 516 visual pigments and excita-

tion, 34, 35, 45, 46
Bonding, chemical, 1-27
Born-Oppenheimer separation and potential surfaces, 4, 5
equilibrium configuration,

isomers of molecules, 4 nuclear vs. electronic motions, 4

Schrödinger wave equation use, 4 diatomic molecules, 5-18 ab initio computations,

17, 18 antibonding, 6, 7 binding and antibinding

regions, 17 bond energies and electronegativity, 14

bonding and binding, 17 charge density distribution contour map, 13

charge density distribution in, 13 configuration mixing, 8 correlation diagrams, 11,

12 dissociation energies of molecules, 7

ground state potential and kinetic energy components, 16

heteropolar case, 9 hydrogen molecule and, 5-7

ionization potentials, 9,

molecular orbital calculation of, 6 molecular orbital theory,

net and overlap populations, 12, 13

net numbers of bonding electron pairs, 7 Pauling electronegativities,

14 photoelectron spectroscopy, 10

population analysis and charge density distribution, 12-14 potential curves, 14, 15 promotion and, 6 Rydbergization and, 6

satellite transition types, 10 SCF orbital energies, 9,

self-consistent fields, 8 valence-bond theory, 8, 9 virial and chemical bonding: sealing, 15-17

polyatomic molecules, 18-27

ab initio calculations, 22, 23

alternant molecular orbitals, 25 electron-deficient mole-

cules, 27 environmental cooperation and, 26

hyperconjugation, 21 increvalent donors and acceptors, 25 localized molecular orbi-

tals, 24, 25 molecular complexes, 25, 26

multiple bonds, 27
prototype molecules structures, 18
sandwich compounds, 26

sandwich compounds, 26 semiempirical calculation methods, 19-22 systematic localization

procedure, 24, 25 Van der Waals molecules, 27 Walsh's rules, 23, 24

spectroscopy role, 3, 4
parts of, 4
terminology of, 5
theories of, 1-3

theories of, 1-3 computer contribution, 3 electron pairs, 1,2 molecular orbital theory,

1, 2, 3

quantum mechanics and, 3 survey diagram of, 2 valence-bond theory, 1-3

Bromine structure of molecules of,

446, 452, 462 Butadiene derivatives asymmetric

CD spectroscopy and, 98, 99

Butane, n-

intermolecular structure of,

C

Carbon hydrides chemical bonds in, 391 Carbon monoxide

adsorption on metal surfaces, 286-94

chemical bonding in, 10, 12 desorption from metals, 295

oxidation on metal surfaces, 301, 302

Carbon monoxide-hydrogen interactions on metal surfaces, 297, 298

Carbon tetrachloride structure of liquid of, 446-

49, 459, 463, 464 Cellulose, hydroxypropyl liquid crystals of, 531

liquid crystals of, 531 Chemical bonding see Bonding, chemical

Chemical bonding described from ab initio calculations, 363-95

bond energies, 394, 395 bond energies and heats of formation of hydrides, 395

first-row hydrides, 387-92 bond-bond repulsions, 387-

Hartree-Fock atomic orbitals line plots, 390 lobe end p orbitals bond strength, 389, 390

low-lying states of CH<sub>n</sub>,

low-lying states of NH<sub>n</sub>, 391, 392

halides, 392-94 fluorine vs. other halogens, 393, 394

ionic bond energies, 393 hydrides for first, second and third rows bond lengths and angles of, 388

second-row atoms, 372-74 GVB wavefunctions, 373 Hartree-Fock configura-

tions, 372, 373 second-row hydrides, 374-87

dissociation in SiH<sub>n</sub>, 379 higher excited states of AlH<sub>n</sub>, 376-78

higher excited states of MgH<sub>n</sub>, 374, 375 higher excited states of

PH<sub>n</sub>, 382-85 higher excited states of

SH<sub>n</sub>, 386, 387 higher excited states of

SiH<sub>n</sub>, 378-81 low-lying states of AlH<sub>n</sub>,

375, 376 low-lying states of MgH<sub>n</sub>, 374, 375

low-lying states of PHn: 382

low-lying states of SH<sub>n</sub>, 385, 386

planar state vs. pyramidal ground state, 385 schematic potential curves

schematic potential curve for AIH, 377, 378

schematic potential curves for MgH, 375 schematic potential curves

for PH, 384, 385 schematic potential curves for SiH<sub>n</sub>, 379, 381

states of ClH<sub>n</sub>, 387 SiH<sub>n</sub> molecules, 364-72 core orbitals and, 364 ground state orbitals, 367

ground state silicon atom, 364-67

GVB orbitals, 366, 367, 369

lobe orbitals, 365, 366, 370-72

low-lying states of SiH, 367-69

low-lying states of SiH 29 369-71 low-lying states of SiH4,

371 overlapping lobe orbitals,

370 SiH(<sup>2</sup>II) orbitals diagram,

368 silicon lobes, 367 singlet spin function, 366 spin symmetry, 364 summary of, 371, 372 triplet spin function, 366 valence orbitals, 364

wavefunction for, 364-67 wavefunction schema, 366, 367 SiN.

hybridization and, 366 Chlorine hydrides states of, 387

Cholesterol

models of membranes and, 331 phospholipid interrelations

of, 331, 332 Chromophores, biological

CARS studies of, 434 Circular dichroism see Dichroism, circular

see Dichroism, circular Coherent energy transfer in solids, 473-94

coherence determination using electron spin resonance, 480-88 coherence in triplet exci-

tons, 483 coherent nature of dimer

transfer, 485, 486 coherent properties of dimers, 483

dimer-exciton microwave dispersions, 486 dimer splitting and, 482

electron behavior at low temperature, 488 electron spin transition experiments, 487

EPR transitions and, 482 exciton bond-to-bond lineshape broadening, 487

expected Larmor frequencies for dimers and excitons, 484 molecular stacking patterns,

480 slow exchange and, 482 tetrachlorobenzene studies,

480
energy distribution functions
as base for experiments,
491-93

coherence length, 493 coherent migration distancerandom walk distance ratio, 492

Dlott-Fayer-Wieting kinetic model, 492

exciton coherence, 493 temperature dependence of X trap and, 491, 492 time evolution of exciton and trap phosphorescence, trapping efficiency, 493 exciton theory and coherence, 475-79 coherent propagation, 477coherent properties of excitons, 477 electrostatic interaction between molecules, 475 exciton mobility, 479 exciton-phonon coupling. 477 - 79Haken-Strobl-Reinecker model, 479 one-dimensional dispersion, 477 oscillation phase, 476 quenching kinetics in finite chains, 479 stationary state, 476 traps and barriers in the chain, 479 introduction, 473-75 coherence in molecular solids, 473 definitions of coherence, 474, 475 exciton diffusion constants, 475 exciton dispersion, 474 periodicity in solids, 473 phonon role, 474 propagation through crystal lattice, 473, 474 reviews on, 473 triplet exciton bands, 474 optical lineshape studies, 488-91 difficulties in use of, 488 Harris exchange model, 490, 491 models for mean free path lengths, 489 Morris-Sceats model, 489 Toyozawa's lineshape model, 488 Collagen CD spectrum of, 104, 105 Copper-nickel alloy CO adsorption on, 290 Crystal high resolution electron microscopy, 251-81 atoms and molecules on surfaces, 269-72

atom movements, 269 growth of surface lavers on crystals, 271, 272 molecules on surfaces, single atoms on surfaces, 269-71 conclusion: future pros pects, 277-81 associated techniques, 280, 281 forward scattering approximation, 280 high voltage use, 279 image intensities computing, 279, 280 microdiffraction, 281 "periodic continuation approximation," 280 spherical and chromatic aberration, 279 extended defects fine structure, 275, 277 weak beam dark-field imaging and, 276 instruments and techniques, 255-69 bright-field STEM, 260, 261 bright-field TEM, 255-59 dark-field STEM, 261, 262 dark-field TEM, 259, 260 electron beam paths for bright-field TEM, 256 energy-loss imaging, 262 projected charge density approximation, 257, 258 projected potential approximation, 258 real and imaginary parts of spread function, 258 introduction, 251-55 "atomic resolution" electron microscopy, 251 "column approximation," crystal defects imaging, 253, 254 diffraction methods, 254, fringe images, 252 "instrumental resolution," "interpretable resolution," 252 low energy electron diffrac-

tion, 254

periodic objects, 252, 253

reflection high energy elec-

tron diffraction, 254 resolution and contrast, 251-53 resolution definition, 251, scanning electron microscopy, 254 single molecules visualized, 251 surface steps, 255 surface structure imaging, 254, 255 techniques for studying surfaces, 255 localized defects in crystals, 272-76 defects in metals and semiconductors, 273-76 defects in oxides, 272, split interstitials and, 275, 276 surface steps, 262-69 contrast from fractional unit cells, 266, 267 diffraction contrast, 266 other techniques, 267 phase contrast imaging, 262-66 sample preparation, 264 Crystals, liquid smectic phases of, 513 "solid liquid crystals, " 528 thermotropic, 531 see also Stiff chain polymer lyotrophic liquid crystals Crystals, organic NLS studies of, 425, 426 Cyclopentane excited state of CD spectroscopy and, 99, 100 Cyclopropane wagging mode in, 436

Dibromonaphthalene, 1, 4-ESR lineshapes of, 487 Harris exchange model and, 490, 491 triplet band state of, 493 Dichroism, circular-spectroscopy and vacuum ultraviolet region, 93-112 CD spectra and the VUV region, 97-112 alkyl amino acids and, 100 alpha-pinene, 97, 98

asymmetric butadiene derivatives, 98, 99 benzene chromophores, 99 biological molecules, 100cyclopropane, 99, 100 ethylenic chromophores and, 97 nucleic acids, 105-8 olefins, 97, 98 positive Rydberg transition, 98 proteins and allied substances, 100-5 small molecules, 97-100 sugars, 108-12 instrumentation, 95-97 hydrogen discharge light source, 95 new instruments produced, 96, 97 noise on CD spectrum, 98 photomultiplier's view of incident light, 96 schematic drawing of VUV CD instrument, 95 introduction, 93-95 circularly polarized light, extinction coefficient, 94 normal isotropic light absorption, 94 right and left circularly polarized light absorption, 94 vacuum ultraviolet region of spectrum, 95 Dipalmitoyllecithins order parameters from, 311, DNA CD spectra of, 105-8

251-81 Electron spin resonance coherence determination with, 480-88 Ethane torsional mode in, 436 Ethidium bromide trypanocidal role of, 360 Ethylene twisting motion studied. 436 Ethylenic chromophore

Electron microscopy, high

resolution crystals and,

CD spectroscopy of, 97

Fatty acids membrane structure and, 311, 317, 322 Ferrocene chemical bonds in, 26 Ferroelectricity in organic materials, 497 ferroelectrics books on, 499 definitions of, 498-500 Fluorine chemical bonding and, 392, 393 Fluorine atoms abstraction of hydrogen atoms by, 75 Formaldehyde reactions on metal surfaces, 300, 301 Formates gas phase adsorption of, 130, 131 Formic acid decomposition on metal surfaces, 298-300

Gelatin apparent molar enthalpy of. 152 CD spectrum of, 104, 105 Germanium crystal defects in, 277, 278 Glutamate, polybenzyl-Lliquid crystalline phase of, 519, 520 Glutamates CD spectra of, 101-5 Gold crystals atom positions in, 252 microstructure of, 267 split interstitials in, 275 Graphite crystal structure of, 265 Guanosine monophosphate illumination effects on, 34

H

Halides chemical bonds in, 392-94 Halogens chemical binding in, 10 ionization potentials of, 11 Halothane

multilaminar liposomes and, Hemoglobin interactions with ligand, 150, 151 Hyaluronic acid CD spectrum of, 111, 112 Hydrides, second-row chemical bonding in, 374-87 Hydrocarbon radicals combination of, 244, 245 Hydrocarbons oxidation on metal surfaces. 303 Hydrocarbons, unsaturated addition of hydrogen to, 243 addition of oxygen to, 243, 244

Hydrogen adsorption on metal surfaces. 286-96 desorption from metals, 294, 295

oxidation on metal surfaces, 302 very high-resolution spec-

troscopy of, 433, 434 Hydrogen, atomic NLS studies of, 429 Hydrogen-deuterium exchange single crystal surfaces and, 296, 297

Hydrogen halides chemical bonding in, 10 ionization potentials of, 11 Hydrogen molecule chemical bonding and, 5-8. 13, 16 Hydroxyl combination with NO and

NOkinetics of, 236, 237 Hypsorhodopsin primary photoproduct of rhodopsin, 47

Inelastic electron tunneling

spectroscopy, 115-37 conclusions, 136 IETS applications, 137 IETS capabilities, 136 IETS resolution, 136 IETS sensitivity, 136, 137 experimental details, 124-29 aluminum oxide surface chemistry, 124 barrier composition, 124

hydroxyl group in electrode, IET spectra measurement, 127 minicomputer control, 127top metal electrode of lead, 126 tunnel junctions preparation, 124-26 types of metal tunnel junctions, 124 IETS application to surface chemistry, 129-36 aluminum role in tunnel junctions, 129 catalytic decomposition of formic acid, 131 catalytic role of, 132-35 chemisorption and, 129 difficulties with, 135 gas phase adsorption of formic acid, 130, 131 hydrogen bonding in alcohol adsorbates, 134 hydroxides and hydroxyl. 136 introduction of adsorbate on oxide surface, 129 "linear" vs. "bridged" configurations on surfaces, orientation of admolecules, 130, 132 oxide film heating, 135 surface structure and, 129 inelastic electron tunneling in solids, 116-18 elastic electron tunneling, oxide layers and, 116, 117 introduction, 115, 116 molecules adsorbed on surfaces, 115, 116 surface chemistry, 115 vibrational spectroscope and, 116 phenomenology of IETS, 118-20 schema for voltage-related entities, 119 schematic energy diagram for inelastic electron tunneling, 118 tunneling spectra and, 118 theory of IETS, 120-24 Born approximation method, conductance at junction,

propagator method, 122 time-dependent perturbation theory, 121 transfer Hamiltonian method, 121 trapezoidal barrier and, 123 tunneling electrons interacting with adsorbate molecules, 121 tunneling phenomena importance, 120 tunnel-junction parameters. 121 Information theory molecular reaction dynamics and, 59-86 Kinetic processes on metal single-crystal surfaces, 285-303 "adsorbed state, " 286-93 alloying, 290 binding energy for CO, 290-93 carbon monoxide adsorption, 286-92 carbon, oxygen and sulfur on metal surface, 291, desorption peaks, 292 gas adsorption, 292 hydrogen adsorption, 286isosteric heats of adsorption, 292 metal carbonyls, 287 metal surface characteristics, 287-92 adsorption/desorption kinetics, 293-95

adsorption, 293, 294

tion and, 293, 294

desorption, 294, 295

precursor state model.

ments, 295

tion, 295

294

surface steps effects, 296 L crystallographic orientadissociative adsorption, isosteric heat measurelattice model and desorpmicroscopic reversibility, NH decomposition on Pt. 41 repulsive potential walls,

rotational entropy of transition state, 295 experimental studies, 285, 286 isoteric heats of absorption, nonsteady state methods. predosing of surfaces, 286 surface reactivity, 285 techniques for, 285, 286 vibrational spectroscopy and, 286 reactions on single-crystal surfaces, 296-303 alcohols oxidation, 302, 303 carbon monoxide/hydrogen interactions, 297, 298 carbon monoxide oxidation. 301, 302 formaldehyde reactions, 300, 301 formic acid decomposition. 298-300 hydrocarbon reactions, 303 hydrogen-deuterium exchange, 296, 297 hydrogen oxidation, 302 isosteric heat of adsorption, 296, 297 single crystal to metal surface comparison, 296

Light energy transduced in visual pigments, 31-53 bacteriorhodopsin structure and function, 36, 37 membrane of, 36 model of, 36 free chromophore, 43-45 conformation, 43, 44 excited states, 44 photochemistry, 44, 45 introduction, 31, 32 bacteriorhodopsin, 31, 32 visual pigment structure, light and dark reactions, 37bacteriorhodopsin, 41-43 bleaching sequences, 38chromophore binding, 37,

chromophore-opsin interactions, 37 conformations of isomers of retinal, 38 resonance Raman spectroscopy, 37-39 rhodopsin, 37-41 photoreceptor morphology and function, 32-36 calcium as transmitter, 34 enzymatic processes affected by light, 34 internal transmitter substances, 32-34 light absorption effects, 32 light adaptation, 33 rhodopsin and transmembrane channels, 34, 35 rhodopsin phosphorylation, rhodopsin structure and location in membrane, 35, 36 rod photoreceptor diagram, 33 sodium permeability of plasma membrane, 33 visual excitation, 34, 35 pigment spectra, 45-47 models of, 46 polyene spectroscopy, 45, 46 synthetic retinal analogues, visual pigments, 45, 46 primary photochemical event, 47-52 bathorhodopsin properties, 47-50 chromophore protein interactions, 50-52 excited states, 51 ground state energy storage, 51, 52 hypsorhodopsin, 47 models for, 52 photochemical cis-trans isomerization? 49, 50 potential energy diagrams for pigments, 48 prospects for bacteriorhodopsin, 52, 53 Liquids, molecular structure of see Molecular liquids struc-Lithium chemical bonds in, 21, 22

Lysozyme

enthalpy surfaces of, 155

Magnesium hydrides chemical bonding in, 374, 375 Magnesium oxide crystals of nitrogen adsorbed on, 27 surface step structure of, 262-66 Membrane structure and dynamics studied by NMR, 307-32 dynamics, 323-27 acyl chain dynamics, 323-26 chain dynamics, 325 chain methylene protons, 323, 326 homogeneous spin-spin relaxation time, 323 interproton magnetic dipolar vector, 325 kink diffusion model, 326 kink formation and diffusion, 325, 326 lateral diffusion, 326, 327 "magic angle," 327 sonicated vesicles, 327 spin-lattice relaxation times, 323-26 stimulated spin echoes, 327 trans-gauche rotations, 325 future prospects, 331-32 biological membranes, 332 cholesterol studies, 331 complex model systems, 332 lipid-protein interactions, 332 model systems, 331 newer methods, 331 head group orientation and dynamics, 327-31 anisotropic motions of, chemical group dynamics, 330, 331 chemical shift anisotropy, 328, 329 choline group orientation, 329 conformation of head group, dynamical models of, 329,

330

dynamics, 330, 331

shielding tensors and, orientation, 328-30 phosphate group orientation. sonicated vesicles and, 328, 331 static shielding tensor. 329 trimethyl ammonium group location, 329 introduction, 307, 308 dynamic models of membrane systems, 308 Electron Spin Resonance studies, 307 NMR difficulties, 307 phospholipid bilayer matrix, 332 reviews on, 308 molecular order determination in phospholipid systems, 309-22 acyl chain order parameters and flexibility gradients, 311-14 axial symmetry in, 309 chain isomerization, 313 chain isomerization distribution functions, 317 chain reorientation, 318 chain structure, 312-18 curvature effects, 319-22 deuterium linewidths, 321, deuterium order parameters, 312 fatty acids in lecithin layers, 311 free induction decay, 314 glycolipid vesicles, 319 gyromagnetic ratios of nuclei, 310 interaction vectors types, interpair dipolar interactions, 320, 321 lipid bilayer structure. 311, 312 lipid chain motion model, 313 liquid crystal systems, 313 matrix of order parameters, 309 mean molecular field model, 312 methyl and methylene segments of, 309, 310, 313-16, 321

organophosphate static

methyl rotors in phospholipids, 316 model for phospholipid motion, 313

nuclear dipolar interactions, 309, 310

order parameter, 309-11 order parameter interpretation, 316-18

order parameters estimated from proton NMR, 314-16 Peterson-Chan model, 318-22

sonicated lipid bilayer vesicles, 318-22

"super-Lorentzian" band shapes, 314-16

theoretical expressions for lineshapes of amphiphillic molecules, 314-16

theoretical models for lipid bilayers, 312

vesicle lineshapes, 318, 319

vesicle NMR spectra, 322 vesicle tumbling, 319, 320 phospholipid bilayer, 308,

309 biological membranes, 308 dispersions, 308 gel and liquid crystalline phases, 308 multilayers and, 308 restricted motion effects,

309
Membranes, biological
NMR studies of, 332
phase transitions in, 157-59
see also Biological systems,

see also Biological systems biological membranes Metals defects in studied, 277

Metal single-crystal surfaces kinetic processes on, 285-303 Methane

Methane structure of, 24 very high-resolution spectroscopy of, 433, 434

Methanol structure of liquid form of, 451

Methylindan, 1-CD and absorption spectra of, 99

Microcalorimetry of biological systems, 141-62

cells and microorganisms calorimetry, 160, 161 clinical and analytical applications, 160 conclusion, 161, 162 covalent reactions studied by, 159

instrumentation, 142-45 commercially available calorimeters, 142, 143

heat capacity calorimeters, 143-45 photocalorimeter, 144

photocalorimeter, 144 reaction calorimeters, 143

introduction, 141 ligand-macromolecule interactions, 148-53

actions, 148-53 antibody-hapten interactions, 149, 150

denaturant binding in proteins, 151

heats of protonation, 149 hemoglobin-ligand interactions, 150, 151

hydrogen ion binding to proteins, 149 mixing calorimeters, 149

other protein-ligand systems, 151, 152

polynucleotide-ligand interactions, 151 protein-protein interaction,

152, 153 protein systems heat capacity changes, 148

reaction rate constants determined by, 159, 160 scanning calorimetry, 153-

low-temperature and hydration properties of biopolymers, 153, 154 membrane phase transitions, 157-59

thermal transitions in biopolymer solutions, 154-57

transition curves analysis, 157

small molecule/model system studies, 145-48 additivity relations, 147, 148

benzene in water enthalpy, 146 concentrative properties of hydrophobic molecules,

146, 147 group parameter values,

148 hydrocarbon compounds dissolution, 145 hydrophobic interaction effects, 147

hydrophobic properties at infinite dilution, 145, 146 polar groups interactions in water, 147

Microwave spectroscopy transient effects in see Spectroscopy, micro-

wave transient effects
Molecular liquids structure,
441-67

correlation function descriptions of static structures, 455-62

atomic and molecular distribution functions, 455-

57 chemical bond length effects, 459

computer simulations, 461 interactions site cluster

diagrams, 461 interaction site cluster series, 459

intermolecular site-site potential, 460 intramolecular distribution

and, 457
Quentrec's method for pair
structure analysis, 456

RISM equation, 459-62 schema of liquid of twoatom molecules, 458 simple chains and chemical bonding, 460

site distribution functions theory, 457-62

experimental probes of static structures, 462-68 coupling of orientational and translation degrees of freedom, 464, 465 dielectric constant and, 466, 467

experimental problems, 462-64

harsh repulsive forces and, 447 light scattering, 465, 466

neutron and X-ray scattering, 462-65 structural factors and, 462

van der Waals picture, 441-47

attractive charge-charge interactions, 447 basic idea of, 441-43 charge layering, 447

computer simulation of fluids, 447 explanation, 443 harsh repulsive forces in liquids, 441-47 Helmholtz free energy and, high density and, 444, 445 hydrogen bonding and, 447 hydrophobic effect, 447 Lennard-Jones liquid, 442 models for, 447 nonassociated liquids, 444 potentials of interaction, qualifications and limitations of, 444-46 radial distribution function, 442, 443 "slowly varying interaction" and, 444 "solvophobic effect," 447 structure and pair interactions and, 442 thermodynamic perturbation theory of liquid, 445 thermodynamic properties, 445-47 van der Waals picture implications for molecular liquids structure, 447-55 Boltzman factor operation, 453 collision theories for, 449, conclusions re molecular relations, 450 coupling and, 449, 450 deficiencies of, 446 dielectric properties and, 451 dipole-dipole interactions and, 451, 452 exceptions to this picture, 446-49 hard sphere model and, 449, 450 impulsive force models, 449 intramolecular charge separations, 452 J-diffusion model and,

450

447

tions, 450 molecular shape and, 446,

model for rotational mo-

neutron-scattering struc-

ture factors, 448

packing models for dynamic structures, 449-51 packing models for static structures, 447-49 packing model from hydrodynamic concepts, 450, 451 perturbation theory and. 446 quadrupole-quadrupole interactions, 452 reference interaction and, 448 simple electrostatic models inapplicable, 451-53 slip boundary conditions, 451 streaming effects, 453 temperature and density dependence of structural properties, 453, 454 tetrahedral ordering of molecules, 454 thermodynamic properties, 454, 455 velocity autocorrelation function, 449 Molecular reaction dynamics approached by information theory, 59-86 inelastic collisions, 69-74 activating and deactivating collisions, 70 Bethe-Teller equation, 72, 73 electronic energy transfer, 74 exponential gap representation, 70, 71 exponential gap rule, 69-71 initial vibrational excitation and, 73 nonlinear surprisals, 71, quenching and, 74 rate constants, 72 rotational energy transfer, 71 - 72R-T and V-R, T, 70 surprisal synthesis and, 72, 73 vibrational energy transfer, 72, 73 V-R, T transfer, 73, 74 information theory, 60-69 background, 60-63 dynamical models, 67, 68 dynamical theory from surprisal synthesis, 66

entropy deficiency, 61 families of chemical reactions, 63 "Frank-Condon approximation, " 67 inelastic collisions analyzed. informative observables, 64 invariance, 67 major energy transfer processes analyzed, 62, 63 mutual information, 64 perturbation theory, 67, 68 prior distribution, 60, 65quantal distributions classical constraints, 66 quantitative measure of information, 64 specificity of energy disposal. 60 stochastic approach, 68, surprisal analysis, 61, 62, 68 surprisal synthesis, 62, 65, 66 tables, 62, 63 theoretical considerations, 64-69 reactive collisions, 74-84 branching ratios, 81-84 collision-induced dissociation, 78 consumption of translational energy, 80, 81 disposal of translational energy, 80 electronic excitation, 81 exothermic and endothermic reactions, 77, 78 exponential gap law, 78 impulsive release, 79 linear surprisal, 77 nonlinear vibrational surprisals, 76 product (vector) momentum distribution, 74 rotational energy, 79 surprisal and, 77 translational energy, 79-81 vibrational energy consumption, 76-78 vibrational energy disposal, 75, 76 road ahead, 84-86

entropic distributions, 65

additional studies, 86 chemical reactivity, 85 molecular disequilibrium, molecular reaction dynamies, 85, 86 mutual distributions analysis, 84 surprisal analysis and synthesis, 84, 85 Molybdenum oxide crystal structure of, 267, 268 Monosaccharides CD spectra of, 108-12 structure of, 110, 111

N

Naphthalene

Nitrogen

dimers of coherence time of, 487 Naphthalene, crystalline two-photon absorption spectrum of, 430, 431 carbon dioxide adsorption on, 287-92 formic acid decomposition on, 299 Niobium oxides atom rows of, 272, 273 crystal structure of, 274,

adsorption on metal surfaces, 293, 294 Nitrogen hydrides chemical bonds in, 391, 392 Nitrogen, molecular chemical bonding in, 10-12 interatomic distribution function for, 461, 464,

465 NMR relaxation studies of solute-solvent interactions, 167-85

low molecular weight solutes, 168-77 dipole-dipole interactions,

168-72 discrete solvation sphere model, 174

electron-nucleus interactions, 169

electrostatic perturbations, 173 - 75high resolution results,

177 intermolecular relaxation

rate, 170 magnetogyric ratio and, 169

models for pair distribution functions, 170, 171 molecular rotation in solution, 176

nonaqueous solutions, 171, 172 nonmetal free radicals,

nuclear electric quadrupie

interactions, 172-76 paramagnetic effects and, 169

pressure effects, 176 quadrupole relaxation problem, 175 recent experimental results, 174-76

rotational diffusion, 177 rotational studies, 176,

solvent-metal exchange rates, 169 vibrational motions of

solvent molecules, 173 water molecule orientation around lithium and iodide ions, 171

macromolecules, 177-84 "bound water" and, 178, intra- vs. inter-molecular

contributions, 179 lamellar liquid crystal systems, 184

nonexponential longitudinal relaxation for solid proteins, 181-83 probe experiments, 180 protein crystals, 181 protein hydration domain,

181, 182 protein hydration sheath,

protein solutions, 178-80

solid protein systems, 181-84 solvent relaxation rates,

182, 183 water adsorbed on protein,

water in solid protein, 181

water-macromolecule interactions, 178 water molecule dynamics, 180

Nonlinear spectroscopy

see Spectroscopy, nonlinear Nuclear magnetic resonance see NMR Nucleic acids CD spectra of, 105-8

Olefins, chiral CD spectroscopy of, 98 Organic substances NLS studies of, 425, 426 Oxygen atoms of reacting with polyatomics, 75

Palladium-silver alloys CO adsorption on, 290 Peptides CD spectra of, 102, 104 Phenol IETS spectrum of, 133, 134 Phenoxide ions chemisorption of, 133 Phosphodiesterase activity of light and, 34 Phosphorus, atomic

low-lying excited states of, Phosphorus hydrides

chemical bonds in, 382-85 Photoelectrochemistry and applications to solar energy, 189-218

electrochemical photovoltaic cells, 212-16 cadmium chalcogenide

electrodes, 215 electrochemical photovoltaic cell materials studied, 214-16

electrode materials and cell performance, 214-

electrode stability, 213 energetics of, 212, 213 introduction, 189-91

Bacquerel effect, 189, 191 early history of, 189, 190 electricity generation, 191 hydrogen uses, 190, 191 photoelectrolysis of water,

photogalvanic cells, 191 "photosensitized electrolytic oxidation," 190

Schottky junctions, 190

semiconductor role, 189, photoelectrolysis cells, 202-12 bond bending values and, 205 coated semiconductors. 210, 211 conversion efficiency, 207, 208 dve sensitization, 211 electrode materials and configurations, 208-11 energetics of, 202-7 energy level sequence diagrams for p/n cells, 206 Gerischer model, 205 kinetic models, 212 overpotential in cells, 204 photochemical diodes, 208photoelectrolysis cell types, 202 photoelectrolysis of water, 203, 207 photoelectrosynthesis, 212 p-n type photoelectrolysis cells, 202, 205-7 quasi - Fermi level concept, 204, 205 Schottky-type photoelectrolysis cells, 202-5 semiconductor materials, 208, 210 semiconductors studied as photoelectrolysis electrodes, 209 statistical thermodynamics and, 204 semiconductor-electrolyte interface, 191-202 capacitance-voltage data, 195

charge transfer models, depletion layer, 192 electrode stability model, 201, 202 electron-hole pairs and, electron transfer model, 200, 201 energetics reviewed, 191-94 energy level diagram, 192, energy level diagrams for electrolysis cell, 198 energy level diagrams for semiconductor-electrolyte

improper ferroelectrics, 514

interface, 200 energy scales, 193 flat-band experimental studies, 195-97 flat-band potentials determination, 194-97 Helmholtz layer, 193, 194 hydrogen and hydroxyl ions, 194-96 illumination effect, 200 pH dependence and, 196, photocurrent-voltage model. 197 photoelectrochemical cell types, 199 photo-induced charge transfer reactions, 197-201 potential barrier generation, 192 Schottky-Mott equation and plots, 195, 196 semiconductor damage, 201, 202 semiconductor electrode stability, 201, 202 space charge layer, 191 valence and conduction band edges, 196 zero zeta potential, 194 Piezoelectricity, pyroelectricity, and ferroelectricity in organic materials. 497-516 biological applications of, 516 definitions, 498-501 electrets, 498 ferroelectric books, 499 ferroelectrics, 498-500 ferroelectrics and thermodynamics, 499 improper ferroelectrics, 499 piezoelectricity, 500, 501 piezoelectrics sign conventions, 500, 501 polarization catastrophes, pyroelectricity, 501 ferroelectric liquid crystals, 513-16 ferroelectric-ferroelastic phase transition, 514 helical structure of, 513,

molecule orientation of,

513

smectic phase of, 513 tanane studies, 514, 515 piezoelectricity and pyroelectricity in electrets, 501-4 dipole orientation in dielectrics, 502 dipoles of permanent dipole moment, 503 electret transducers, 502 hydrostatic piezoelectric and pyroelectric coefficients, 503 model of local fields, 502 polarizability magnitude, 503 space charge effects, 502 types of electrets, 501 polyvinylidene fluoride studies, 504-13 ferroelectricity and, 505-8 piezoelectricity and pyroelectricity, 508-13 see also Polyvinylidene fluoride polymer Pinene, alpha CD spectroscopy of, 97, 98 Platinum hydrogen-deuterium exchange on, 297 NH3 decomposition on, 294 Polyamides, wholly aromatic fiber strength of, 509, 530 liquid crystals of, 529 solubility of, 529 viscosity of, 529 Polyamino acids other types of, 528 poly-γ-benzyl-L-glutamate, 521-28 addition of halogenated organic acids to, 527 cholesteric-nematic phase conversion, 526 cholesteric screw axis of, 525 concentration dependence of viscosity of, 524 deformation modes of nematic crystal, 527 flexible side chain role, 523 helical structure of, 526 helicogenic solvents and, 522 helix properties of, 522 hydrodynamic properties of, 527

isotropic phase viscosity,

Ribonucleic acids

RNA

structure of, 337

structure of, 35, 36

see also Light energy trans-

CD spectra of, 106, 107

duced in visual pigments

isotropic to liquid crystal phase conversion, 523 lattice model phase diagram of, 521 liquid crystalline phase, 523-28 magnetic effects on, 526 optical properties of, 525, 527 osmotic second viral coefficients, 522 periodicity from polarizing microscopy, 525 phase stability and thermodynamics, 521-23 phase stability limits, 522 quasi-elastic light scattering studies, 527 solid state studies and, 527 solvent spin-lattice relaxation, 526 temperature-composition phase diagram for, 522 thermodynamic "goodness" of solvent for, 522 twist viscosity coefficient, X-ray diffraction studies of. 526 stiff chain polymers of, 520, 521 Polycarbonate NMR spectra of, 405-7 Polyfluorothylenepropylene dielectric uses of, 498 Polyheterocyclics, aromatic properties of, 530 Polyisocyanates properties of, 530 Polyisocyanides properties of, 530 Polymer liquid crystals see Stiff chain polymer lyotrophic liquid crystals Polymers, biological low temperature and hydration properties of, 153, 154 thermal transitions in, 154-Polynucleotides interactions with ligand, 151 Polypeptides CD spectra of, 103-5 Polyguinolines liquid crystals of, 530, 531 Polysaccharides CD spectra of, 111, 112 Polyvinylidene fluoride poly-

mer defects in, 515 ferroelectric properties of, 497, 498, 505-8 dipole orientation and, 507 hysteresis loop and, 507 model of poling process. 506 poling process and, 506-8 stretching effects, 505 piezoelectric and pyroelectric properties of, 508piezoelectric coefficients, 509-11 primary pyroelectricity, secondary pyroelectricity, 509-12 thermal expansion coefficients and, 509, 510 possible uses of, 512, 516 properties of, 504, 505 pyroelectric properties of, 505, 512 pyroelectric coefficients, 512 remnant polarization in, 516 structure of, 504-6 summary of properties of, 510 Propylene structure of, 21 Proteins CD spectra of, 100-5 denaturant binding in, 151 hydrogen ion binding to, 149 interactions with other proteins, 152, 153 ligand systems with, 151, solid systems of, 181-84 water solutions of, 178-80 Pyroelectricity definition of, 501 Pyroelectricity in organic materials review on, 497 see also Piezoelectricity, pyroelectricity and ferroelectricity in organic materials

R

Rhodopsin

bleaching sequence of, 40

photobleaching of, 159

Silicon crystals of atom rows in, 253 Silicon and its hydrides chemical bonding in, 363, 378 Sodium chloride fused molecular forces in, 447, Solar energy conversion photoelectrochemistry and, 189-218 Solids coherent energy transfer in see Coherent energy transfer in solids Solid state NMR, high-resolution, 397-417 background of, 398-404 chemical shift Hamiltonian, 401-3 chemical shift tensor, 401, 402 dipolar Hamiltonians, 400, double quantum schemes, 402 electric field gradient and, Hamiltonian components, 398, 399 heteronuclear dipolar decoupling, 404 "magic angle," 401 multiple-phase techniques, 401 quadrupolar Hamiltonian, 403, 404 solid state NMR techniques for, 401 symmetric portion of chemical shift tensor, 402 Zeeman Hamiltonian, 399 heteronuclear dipolar vs. dilute-spin chemical shift Hamiltonian, 409-13 cross-polarization rates,

410

pulse sequence for, 410,

theoretical heteronuclear dipolar-modulated chemical shift spectra, 412, 413

homonuclear dipolar vs. abundant-spin chemical shift Hamiltonian, 414-16

chemical shift principalaxis frame, 415 inhomogeneous sample,

414 refocusing pulse and, 414

theoretical fits of spectra, 416 more complex characteriza-

tion schemes, 404-9 chemical shift powder pat-

terns, 405 chemical shift spectra of BDEP, 408

classification of chemical environments, 406 cross-polarization NMR spectra of polycarbonate,

405
dipolar-chemical shift

Hamiltonians correlation, 407-9 dipolar-decoupled cross-

polarization NMR spectra,

dipolar Hamiltonian, 409 dual-frequency domain analysis, 409

free induction decay spectra, 409

sample spinning, chemical shifts, 404-7

sideband intensities and, 406

tilting spinning axis, 406 Solutions

solute-solvent interactions NMR relaxation studied, 167-85

Spectroscopy

see Inelastic electron tunneling spectroscopy

Spectroscopy, microwave transient effects, 537-56

experiments, 544-52 boxcar integrator, 545 dipole-dipole collisions, 550

double resonance, 546-48 fast passage, 546 Fourier transform micro-

wave spectroscopy, 551,

frequency switching, 544 instrumentation, 544, 545 microwave detector signal, 546

microwave echoes, 551 off-resonance emission, 545

pulse sequences, 548-51 pumping radiation, 544 Q-switched laser, 547 split waveguide cell, 551 Stark-modulated infrared

laser-enhanced transient mutation, 547

Stark-modulated spectrometer, 544 Stark switching, 545

superheterodyne detection, 551

transient absorption, 548 transient effects experiments, 544

transient emission, 545, 546, 549

transient signal at microwave detector, 550 introduction, 537, 538

energy transfer between gas molecules, 537 reviews and, 537, 538 Stark switching, 537

numerical results and discussion, 552-56 future research in microwave transient effects.

555 OCS vs. NH<sub>3</sub>, 552-55 substances studied, 555

theory of, 538-44
absorption and emission
definitions, 543

approximations and interpretation of T<sub>1</sub> and T<sub>2</sub>, 540-42

Bloch equations solution, 542, 543

collisionally induced transitions, 541 detector current for, 540

Doppler shift and twolevel transient processes, 543

double resonance, 544 electric dipole analogues of Bloch equations, 539 optical Bloch equations, 538-40

pressure-dependent frequency shifts, 539 relaxation terms treatment, 541

rotating-wave approximation, 540 Spectroscopy, nonlinear, 421-

36 hyper-Raman spectroscopy, 435, 436

organic molecules studied by, 436

introduction, 421-25 advantages of NLS, 424 coherent optical effects,

424
"energy resonance denominators," 423

frequency argument, 423 multiphoton molecular spectroscopy, 421

nomenclature, 422 nonlinear optics and, 422 nonlinear susceptibility, 422-24

other reviews, 425 polarization and susceptibility, 422, 423

tuneable lasers, 422, 424 second order nonlinear susceptibility, 425, 426 centrosymmetric media,

organic crystals and, 425, 426

second harmonic generation, 425

third order nonlinear susceptibility, 426-35 benzene studies, 430

centrosymmetric media and, 427 coherent anti-Stokes Raman

spectroscopy, 432-34 direct absorption technique, 428 Doppler-free two-photon

spectroscopy, 429 induced birefringence, 435 inverse Raman spectroscopy, 431, 432

optically heterodyned RIKE technique, 435 Raman-induced Kerr effect spectroscopy, 434, 435 stimulated Raman spectros-

copy, 431 symmetry selection rules, 427

three-wave light mixing, 432-34

three-wave mixing and twoproton absorption, 434 three-wave mixing technique, 432, 433 two-photon absorption and nonlinear light mixing, 429, 430

two-photon absorption experimental design, 428-30

two-photon absorption results, 430, 431 two-photon absorption reviews, 428

two-photon absorption spectroscopy, 426-31 two-photon excitation

technique, 428, 429 two-photon fluorescence method, 428

two-photon ionization technique, 429

two-photon photoacoustic technique, 429 two-photon thermal lens

two-photon thermal lens technique, 428, 429 Stark switching

applications of, 537

Stiff chain polymer lyotropic liquid crystals, 519-31 aromatic polyheterocyclics, 530

introduction, 519-21 biological polymers, 519 industrial interest in, 521 ordered phase stability, 519

stiff chain synthetic polymers, 520

miscellaneous polymers, 530, 531

other polyamino acids, 528 optical studies on PELG, 528

temperature-composition liquid crystal-isotoropic phase equilibrium, 528

polyamino acids-poly-γbenzyl-L-glutamate (PBLG), 521-28

"solid liquid crystals," 528 see also Polyamino acids, poly-γ- benzyl-L-glutamate

polyisocyanates, 530 polyisocyanides (polyisonitriles), 530

wholly aromatic polyamides and polyamide hydrazides, 529, 530

Sugars CD spectra of, 108-12 Sulfur, atomic ground state configuration

of, 386 Sulfur hydrides

chemical bonds in, 385-87 Surfaces

atomic resolution electron microscopy of, 251-81

Surfaces, metal single-crystal

kinetic processes on, 285-303

Surface species vibrational structure see Inelastic electron tun-

see Inelastic electron tunneling spectroscopy

T

Tanane

ferroelectricity of, 514, 515

ferroelectric molecular crystal of, 497, 498 Tetrachlorobenzene, 1, 2,

4, 5coherence determination

and, 480, 485-88, 492, 493 Tetrachloroethylene

twisting vibration of, 436
Tetracyanoquinodimethan
complexes

electrical conductivity of, 515

Tetracycline

microbial cultures and, 161

Thorium atoms of

migration on graphite surface, 271

Toluenium ions chemical bonds in, 22, 23

Transient effects microwave spectroscopy

see Spectroscopy, microwave transient effects Trichloracetic acid

dimerization of, 414, 415 tRNA structure and dynamics

studied by NMR, 337-60 cation and polycation binding to tRNA, 346-51 continuous wave proton

NMR spectra, 347, 348 exchange rates of ring NH hydrogen-bonded protons, 349, 350 magnesium binding, 346-50

relaxation rates for base pair protons, 350 spermine role in binding, 346-48

ligand-tRNA complexes, 360 ethidium bromide and, 360 protamine-RNA complex, 360

tRNA interactions during biological function, 360 tRNA-tRNA complexing,

(FUra)tRNA <sup>19</sup>F NMR, 358 proton decoupled <sup>19</sup>F, 358 temperature-jump kinetics correlated with NMR studies of tRNA, 356

tRNA crystals X-ray analysis, 340-42

polynucleotide folding and, 340, 341

polynucleotide sugar-phosphate backbone in, 341 stacking interactions of

bases, 340 sugar packer geometry of, 340

tertiary interactions in, 340, 342

tRNA exchangeable hydrogenbonded protons, 342-46

continuous wave proton NMR spectra, 345

diamagnetic biopolymers and, 342 exchangeable ring NH reso-

nances, 346 hydrogen-bonded protons in proteins and nucleic

acids, 342 NMR resonances and, 342-

44 reviews on, 342

tertiary interactions and, 344

Watson-Crick hydrogen bonds and, 342, 343 tRNA nonexchangeable pro-

tons, 351-56 methyl resonance, 352-56

methyl resonance, 352-5 mononucleotides NMR parameters, 354

NMR studies of, 351-56 nucleotides studied, 351

temperature dependent modified base proton chemical shifts, 351, 355

#### 596 SUBJECT INDEX

thermal unfolding of tRNA. tRNA sequence, 337-39 folding pattern of, hairpin loops of, 337 sugar-phosphate backbone of, 337, 338 tRNA <sup>31</sup>P NMR, 356-58 components of main cluster, 357 proton decoupled 31P NMR spectra, 357 scattered resonances of, unfractionated tRNA 13C NMR, 359 selective enrichment studies, 359 Tungsten atoms of

attachment to graphite
surfaces, 269
carbon monoxide adsorption
on, 287-93
Tungsten oxide
crystals of
defects in, 276
U
Uranium
atoms of
carbon attachment of,
270
single atoms visualized,
253

Visual pigments light energy transduced in, Water
structure of, 24
RISM approach to, 464
van der Waals picture of,
443, 447, 451-54
X
Xenon
absorption on graphite crystal, 272
Z
Zirconium-niobium alloys
defects in crystals of,

31-57

273

